MOTOR AGE

Published Every Thursday by the
CLASS JOURNAL COMPANY
Mallers Building
CHICAGO ILLINOIS

Entered as Second-Class Matter September 19, 1899, at the Postoffice at Chicago, Illinois, Under Act of March 3, 1879—Member of the Audit Bureau of Circulations—Copyright, 1917, by the Class Journal Co.

United States, Mexico and U. S. Possessions One Year $3.00
Canada .....One Year $5.00
All Other Countries in Postal Union.....One Year $6.00

BEWARE OF SUBSCRIPTION SOLICITORS OFFERING PREMIUMS OR CUT RATES—ALL CURRENCY SHOULD BE SENT BY REGISTERED MAIL.

RENEWALS or CHANGES OF ADDRESS should be sent two weeks in advance of date they are to go into effect. Be sure to send old as well as new address to avoid unnecessary delay. RECEIPT of first copy is acknowledgment of subscription.

Vol. XXXIII Chicago, February 21, 1918 No. 8

Contents

NO LIBERTY TRACTOR..... 5
YEAR'S TRACTOR PROGRESS GREAT..... 7
A report on the Kansas City tractor show, including brief descriptions of the new models.
TO SHIP ROAD MATERIALS..... 15
EDITORIAL—KEROSENE CAMOUFLAGE—CARBURETER AIR CLEANERS—POLITICAL HIGHWAYS 18
MORE TRUCKS AND STANDARDIZATION..... 20
FORD CARS CUT HALF..... 22
U. S. NEEDS SHIPBUILDERS..... 25
RACING REVIVAL PENDING..... 27
FARM TRACTOR MAINTENANCE..... 28
ELECTRICAL EQUIPMENT OF THE MOTOR CAR 32
MOTOR DEVELOPMENT 44
Holley universal carbureter, Frederickson caster safety axle and Harvey truck improvements described and illustrated.

DEPARTMENTS

ACCESSORY CORNER 35
READERS' CLEARING HOUSE..... 36
MOTOR CAR REPAIR SHOP..... 42
AMONG THE MAKERS AND DEALERS..... 46
FROM THE FOUR WINDS..... 48

"NORMA" BALL BEARINGS

(PATENTED)

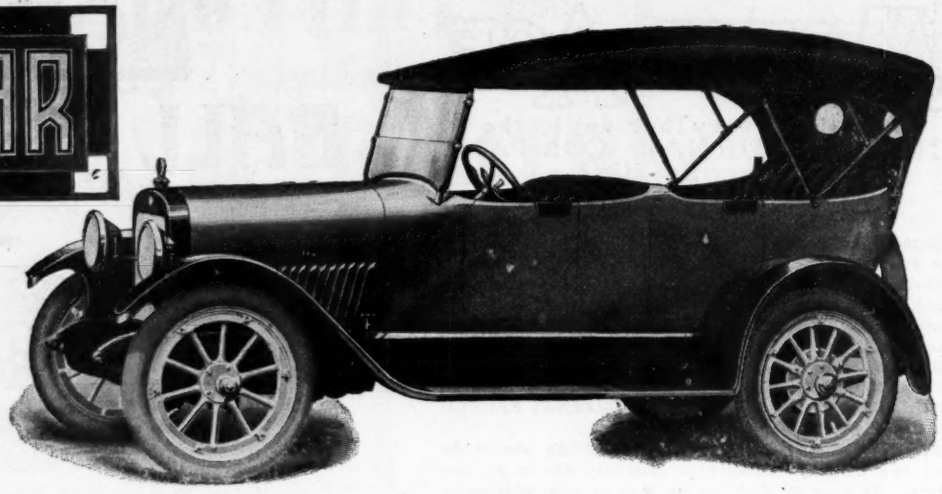
Quality—a thing sought after by every car and truck builder—a thing intangible, almost indefinable, but the most desirable element in a car or truck. One thing, however, is sure—quality must be consistently uniform throughout every part, every accessory, and every part of every accessory. There can be no minor flaws in the perfect jewel of high quality.

"NORMA" High-Quality Bearings are the standard bearings in those high-quality magnetos and lighting generators which are found so consistently good as to be the standards on high-quality cars and trucks. "NORMA" Quality explains.

Be SURE. See that your Electrical Accessories are "NORMA" Equipped.

THE NORMA COMPANY OF AMERICA
1790 BROADWAY NEW YORK
Ball, Roller, Thrust and Combination Bearings

ELCAR



Six New Models

Three 4-cylinder models, three 6-cylinder models, Five-Passenger Touring Car, Four-Passenger Touring Roadster and Five-Passenger Sedan. Price range, $1095 to $1795, f. o. b. Elkhart, Ind.

Reliable Quality Is A Certainty in the Elcar

It is made with the same care that we used to put into our models selling up to $3,000. A car of quality appearance! A car of quality service! With VALUE put into every detail!

The roomy Elcar body is designed in long, graceful, distinctive lines. The workmanship is painstaking, the paint work exceptionally high-class. It's a car you'll be proud of.

You will find the Elcar a satisfying car to own. It's responsive—easy to handle in crowded streets. It's a car with speed, quick action, flexibility. A car of low up-keep and economy. Its built-in quality insures good service for years to come.

See the Elcar at your dealer's. Convince yourself that it is truly a quality car at a popular price. Write, and we will tell you your nearest dealer's name.

Brief mention of Elcar points:

Four-cylinder models, 37½ horse power at 2100 r. p. m. Six-cylinder models, 40 horse power at 2100 r. p. m. Two unit electrical system. Long wheelbase, 116 inches; road clearance 10½ inches. Full floating rear axle with spiral bevel driving gears. Timken Roller Bearings front and rear. Double universal drive; tubular propeller shaft.

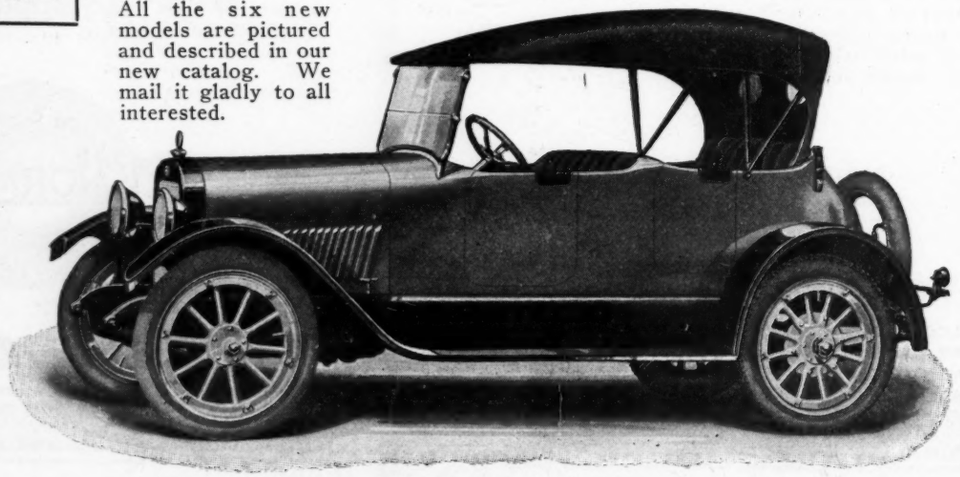
A wonderfully easy riding semi-elliptic spring suspension. Roomy and comfortable bodies of beautiful design and durable finish, new "Cathedral Pipe" upholstering. Equipment complete, even to motometer.

Catalog on Request

Elkhart Carriage & Motor Car Co.

C-781 Beardsley Avenue **Elkhart, Indiana**

All the six new models are pictured and described in our new catalog. We mail it gladly to all interested.



Dealers

Look at the value—look at the price—then get in touch quick if you are interested. Our increased production will enable us to accommodate a few more live dealers in picked territories.

Vol. XXXIII, No. 8 Chicago, February 21, 1918 $3.00 Per Year

MOTOR AGE

No Liberty Tractor

Emphatic Denial That Washington Is Considering a Standardized Design

By David Beecroft

Directing Editor Class Journal Co.

KANSAS CITY, Mo., Feb. 16—The Kansas City tractor show, at which approximately 80 per cent of the tractor manufacturing industry was represented, served to develop the fact that practically the entire tractor manufacturing industry is opposed to any standardized, or Liberty tractor, that it has been declared the Government has under consideration.

It was denied emphatically at Kansas City by a Government official that Washington is working on or even considering a standardized tractor. Extracts from several letters stating such was shown, which were sufficient proof that the standardized tractor is a mere rumor.

In these days of standardized aviation engines, standardized war trucks and standardized motorcycles, some may ask, "Why not the standardized farm tractor?"

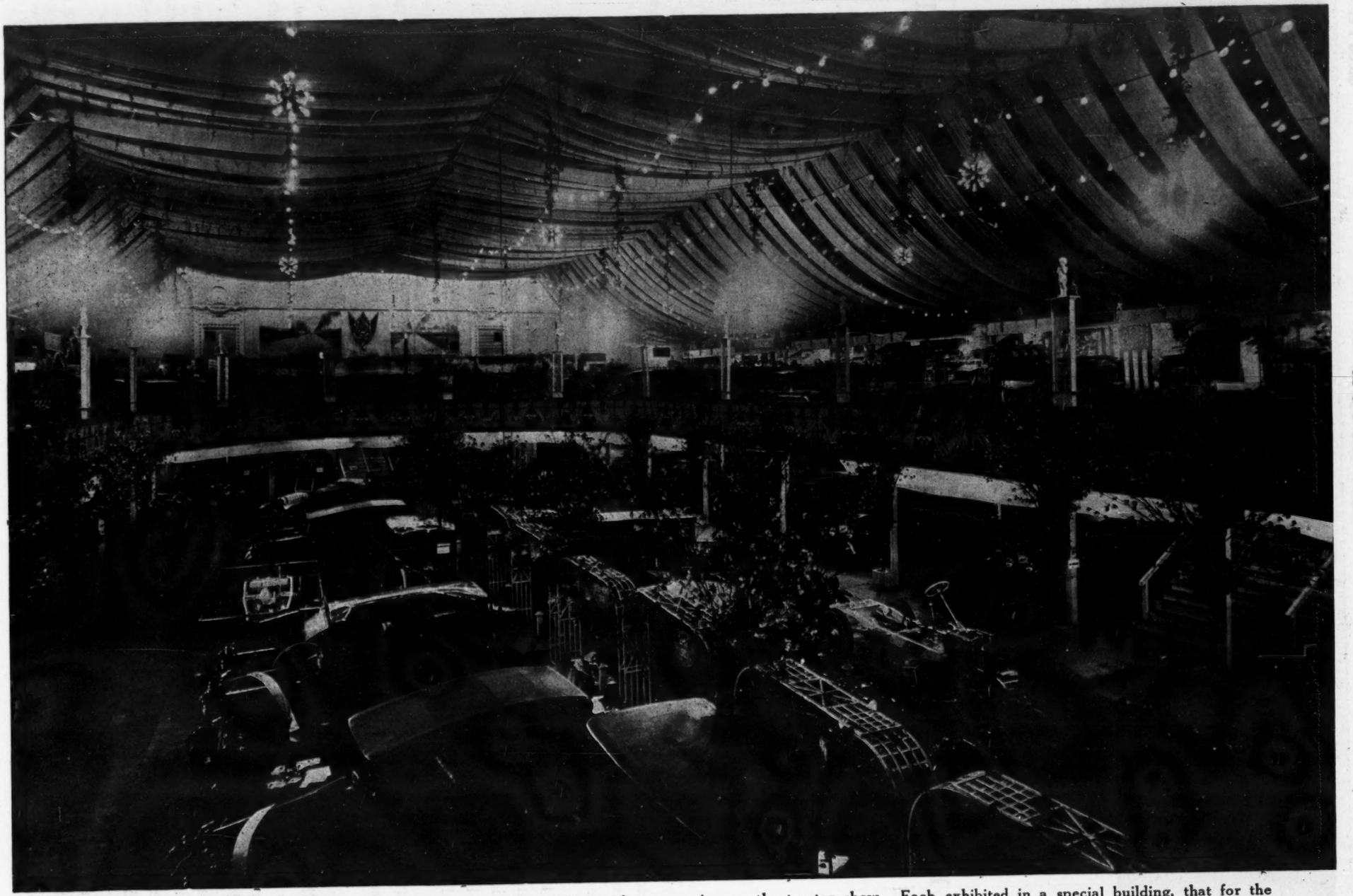
The answer is brief. The immediate need today is more tractors to plow the land that must be plowed this coming spring. Kansas has only 6,000 farm tractors, yet 24,000,000 acres of land must be sown in Kansas this spring. We must have bread and more bread, and that bread is needed this year and not two or three years hence. We must increase the production of our present tractors to the maximum.

Further: The rumor of a standardized tractor circulating through the country would do much damage. It would hold up sales. Perhaps hundreds of thousands of farmers immediately would sit back and wait. They would postpone buying a tractor until the standardized one comes out. That policy would be diametrically opposed to the needs of the hour, namely, more tractors for this coming spring and summer.

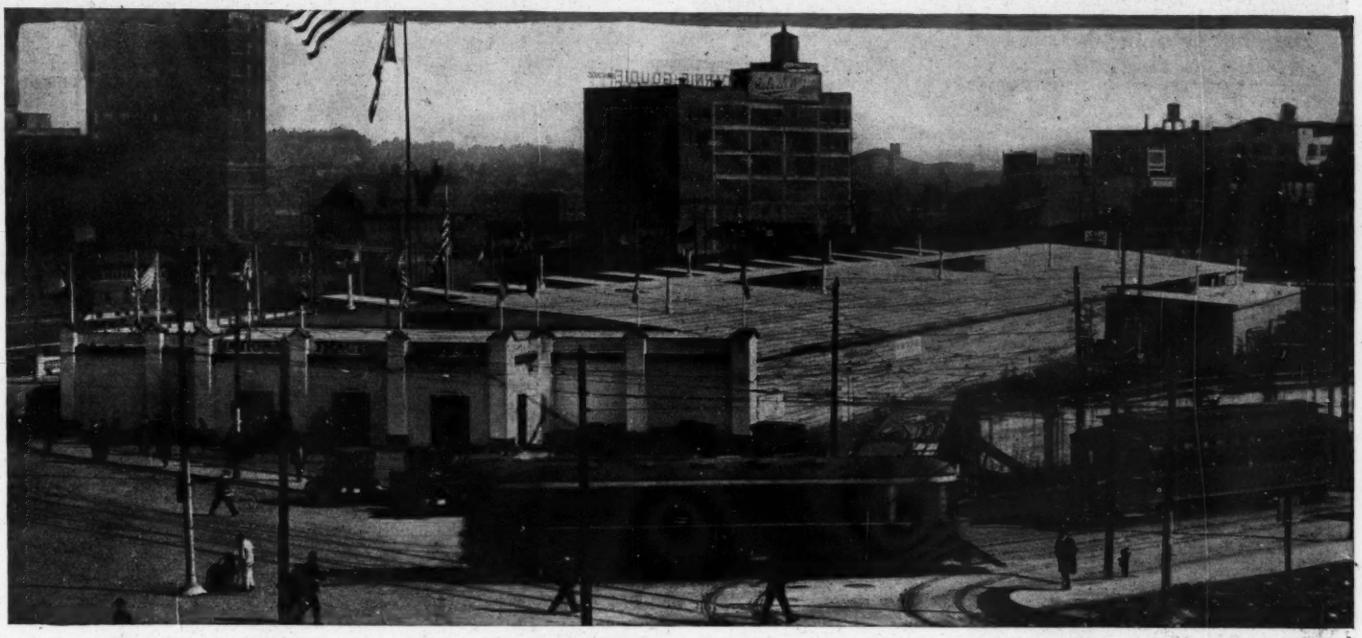
Again: The tractor situation is not comparable with aviation. There is but one customer for airplanes, the Government. The entire matter is in the hands of the Government. The Government is responsible for the fighting in France, and it is this Government that must use the airplanes. With the tractor it is different. The workers of the 6,000,000 farms in America are all prospective purchasers of tractors. Each one is a law unto himself. There are thousands of different conditions to meet on these farms. Plowing in the corn belt of Illinois is vastly different from rice farming in Arkansas. Plowing on the large Dakota farms is different from plowing on the smaller farms of Indiana, Ohio, or even Eastern Kansas.

The lines from Longfellow are particularly appropriate to the present tractor needs, namely, using tractors right now and not waiting for any possible future creations.

"Trust no future, howe'er pleasant,
Let the dead past bury its dead,
Act, act in the living present——"



General view of the motor car show which was held in Kansas City at the sam e time as the tractor show. Each exhibited in a special building, that for the tractors being built specially for that purpose in the Union Station Plaza



The building erected specially for the Kansas City t ractor show. It contains 15,000 sq. ft. of floor space

Year's Tractor Progress Great

Increased Demand Brings Larger Crowd to Third Annual Kansas City Show

KANSAS CITY, Mo., Feb. 16—Kansas City, in its third annual tractor show, has given America the best chance of measuring up the tractor development of the last year, and while only 80 per cent of the industry was represented, that percentage was made up of the best firms, although there were some firms not represented that are more worthy than not a few that were present. The representation was such as to merit national significance as applied to the manufacturers represented.

The forty-five makers present showed their latest designs, those that had changed in the last year, and but one verdict can be given, namely, that there has been great tractor progress in the last year and the design shows the unmistakable influence of the motor car industry. The entire trend is a coincidence with the best motor car practice, using better steels, better bearings, inclosing parts, reducing weights and adding electrical equipment.

A corner of Kansas City convention hall, where motor cars were exhibited

The show was not complete before Thursday, as up to that time belated tractors were entering. One of the latest to arrive was the R & P, built by Ruggles and Parsons, the leading spirits in the Republic Motor Truck Co. The R & P is naturally a motor car design with its Torbensen special tractor design of internal-drive axle; with the pressed steel frame, the first ever used in a tractor; and with its Italian creeper-type wheels as used on war trucks.

Several New Tractors

There were not a few other new tractors seen for the first time at the show. One was the Trojan, which incorporates a new design for three-speed gearset designed by Foote Brothers, who for years have been large makers of gears for tractors. This gear set design allows the use of a live rear axle, just as used in motor cars or trucks, and yet there is the 60-in. rear wheel, which seems the ideal size, according to several tractor builders. It had been said that you could not use motor car gear design and yet use 60-in. wheels, due to difficulties of gear reduction and tooth pressure, but it has been done, though as yet the job has not been extensively tested out. Still a further feature of this job, which is shown in a new tractor, is a spring drive in the rear wheels. This is to absorb start-

The Trojan exhibit at Kansas City, one of the new tractors, which embodies the Foote three-speed gearset

ing jar and so relieve the gears from much strain.

But other makers have been working on the same job of making a tractor with a live rear axle just like the motor car. The new Sexton, also shown for the first time, accomplishes this but uses a 48-in. wheel. To do this it uses a new gearset, specially designed by the Nuttall company, which also specializes on tractor gears. This is a typical new job in that all gears in the set are forged and heat treated and anti-friction bearings are used. It is typical of how the lessons of the motor car are being injected into tractor design. These gearsets are all much larger and heavier than those used in motor cars or trucks.

The show had a number of other new machines, evidence of the brain power that is going into the tractor business and also evidence of the fact that every one of the 6,000,000 farms in the U. S. A. is a prospect for the tractor. At no other time are they so necessary as to-day, when farmers are short handed and more grain is needed.

J. T. Creeper Type

One of the new ones is the J. T., made by the J. T. Tractor Co. of Cleveland. It is a creeper type, with one creeper at each side like the Cleveland tractor. It steers by a pair of expanding brakes working on the differential, so as to hold half of the differential to make a turn.

Another new one is the Plano, made at Plano, Ill., by the Plano Tractor Co. It is a typical four-wheel, four-cylinder design, and uses a cast steel bottle-neck style of frame and also has manganese gears on the drive wheels which run without oil and are guaranteed for two years.

Fairbanks-Morse & Co. showed for the first time two of its kerosene tractors, which have been made for some years but not sold in the Mississippi valley. They are called the Fair-Mor. One is a novelty in that it looks, and purposely so, like a steam locomotive, with the boiler made up of the radiator and the firebox containing the transmission and the kerosene tank. It uses a twin engine. The other model is a smaller and conventionally shaped job.

But the story of new tractors and tractor changes cannot be told in a paragraph or so. It is really a serial story and only a few high spots will be recorded here.

The Parrett tractor has been literally remade, although the original design has been rigidly adhered to. It has a new three-speed gearset, with the high indirect for fast traveling to and from work. It has inclosed internal-gear drive to the big 60-in. wheels in place of the exposed spur-gear drive of previous models. Instead of having the two large driving wheels and the two steering wheels carried on plain bearings they now are carried on Timkens. There is a new Buda tractor engine in it. Provision is made to give two complete sets of gear ratios by an eccentric mounting for the rear axle, and much has been done to increase accessibility.

The new Bates combination creeper and wheel type that was shown last fall at the Fremont tractor meet was shown and it is one of the attractive jobs. Instead of rear wheels there is a short creeper on each side. Moving pictures showing the job in operation were an attractive feature of the Bates exhibit.

The Fordson, the new name for Henry Ford's job, was not there, but there were some other worm-driven jobs, although there is not a great deal of movement in the direction of using worm-drive for tractors. The difficulty seems to be the problem of getting large diameter rear wheels and securing the necessary gear reductions. Ford uses a 42-in. wheel, but many argue that a larger diameter wheel is essential to get necessary traction on soft farm land. There is the Coleman tractor which has worm drive and gets a reduction of 50 to 1 and uses a worm wheel 26 in. in diameter and a 4-in. worm. Here the wheels also are 42 in., or the Ford size.

Hart-Parr has a new design which employs a horizontal twin-cylinder engine that burns kerosene. It uses a gearset that employes SKF and Hyatt bearings and has exposed gear drive.

There are two new tractors to be announced in the next few months that were not shown, their makers preferring not to show them until all the old models were sold. Both of these models will come from large reliable manufacturers, and their designs will show the still further influence of motor car engineering. One will show it in the great reduction in weight over previous models and the other in the wider application of the electric system, even to the extent of electric starting and lighting.

Older Concerns There

There were nearly two score of tractor makers who have reliable designs and have been manufacturing for many years. The J. I. Case T. M. company had its entire line. Emerson-Brantingham showed its several models. The Minneapolis Steel & Machinery Co. showed its Twin City model which bears a striking resemblance to a huge racing car. The J. I. Case Plow Co. had its Wallis, one of the neat designs of the show, with the base of the engine serving for a tractor frame. Then there was the Rock Island Implement Co. with its friction-driven Heider; the three-wheel Atlas from Indianapolis; the varied Avery line with its characteristic individuality of design; the large Rumely that will pull a dozen plows; the equally large Aultman-Taylors; Mogul and Titan made by the International Harvester Co.; the Four-Drive, which is the pioneer in the tractor field with power applied to all four wheels and with motor car parts throughout, using forged gears, roller bearings and shaft

drive, and the Cleveland creeper type. Then there are a dozen others such as Nilson, Waterloo, Leader, Square Turn, Samson, Moline Universal, Noble, Russell, Velie, Lauson, Wisconsin, Huber, Gile, Sandusky, Bullock, Acme, Pan, etc.

Holt, the father of the caterpillar, and the only one priveleged to use the word caterpillar, was not present. Among others not present were the Gray, drum-drive from Minneapolis; and Wolverine, Appleton, Beeman, Beltrail, Trundaar, Chase, Eagle, Fageol, etc.

The show attendance was far in advance of last year or the previous one, which is doubtless due to the enormously increased demand for tractors. The farmer to-day realizes that he cannot till all of his land without one. It is no longer a question of whether a tractor is an essential or not but rather which tractor should be purchased.

The show was improved greatly by being held in a speciall constructed building with over 15,000 sq. ft. of floor space. It was ideal for the show and gave the tractor and accessory makers as well as the implement people all the space they required.

The accessory end had much of interest. Buda showed its brand new tractor engine with detachable cylinder head and intended primarily for burning kerosene. More details of it apepar in another part of this issue. Remy showed a most interesting electrical system including an electric governor for the engine speed, which has the advantage that the governor control can be placed where desired and by it the engine can be set at a speed needed for the job. It is just as simple to alter the governor limits as to open or close the throttle. This is the first electric governor produced and it is meeting with very general interest.

New Remy Magneto

Remy also showed its new dust-proof and water-proof magneto. It had one working constantly under a spray of water and another one running in a bell jar into which was injected a constant cloud of dust. The Remy exhibit included a motor with an electric generator and starter attached, specially designed for tractor work.

Bearing people were well represented and Hyatt had a very novel exhibit in the form of a painting of a tractor chassis with all parts diagrammed and real Hyatts inserted wherever such are being used.

Air cleaners are in much demand, but the number of exhibitors was not so large as it should have been. The Bennett, the pioneer in the field, was not exhibited although it was fitted on many of the engines. A new cleaner shown is the Leonard, which washes the air through water and then passes it through four thicknesses of wire mesh and later through a coarser screen. It is a large job, like a vertical cylinder and is 10 in. in diameter and nearly 30 in. in height.

Radiators, carbureters, ignition apparatus, piston rings and many other tractor accessories were shown in great numbers. There also was a generous exhibition of tractor converter devices, namely, those that take a Ford or other chassis and add a rear axle and wide rear wheels and get a tractor that can function on the farm. These devices were barred from the Fremont demonstrations last August but are back in the fold, so far as the show is concerned. Outside of the show the Schofield converter, which carries the entire car on a truck with four wide wheels was exhibited. The car power drives the truck which is used for all farm work. Any make of car can be used, and no changes are made on the car.

Exhibitors of Tractors

At Kansas City

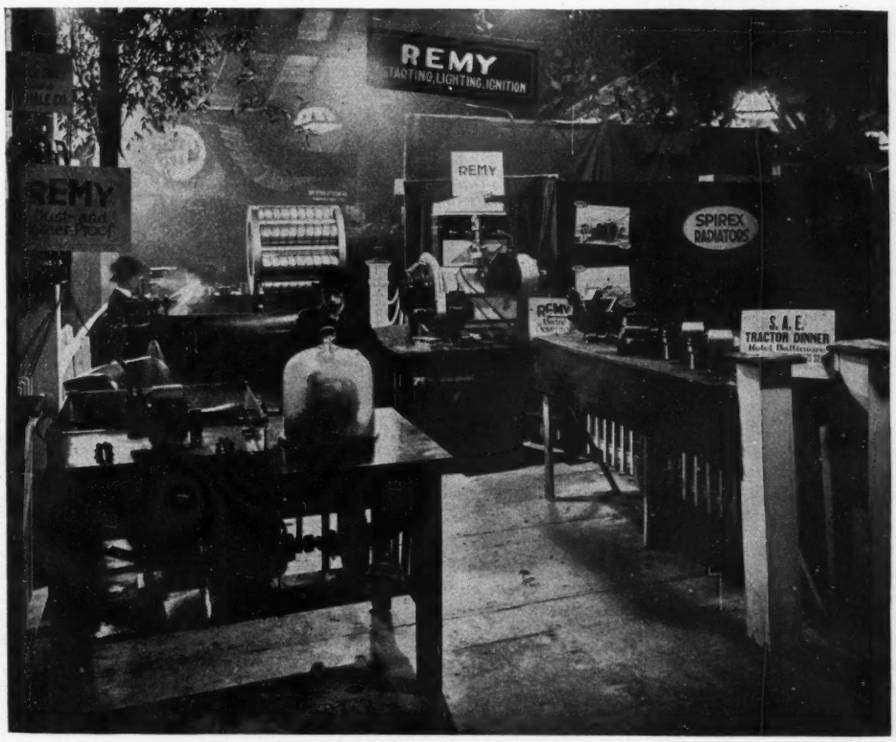
Advance-Rumely Thresher Co.	Rumely
Avery Co.	Avery
Bullock Tractor Co.	Creeping Grip
J. I. Case Plow Works	Wallis
Cleveland Tractor Co.	Cleveland
Dauch Mfg. Co.	Sandusky
Dayton-Dick Co.	Leader
Electric Wheel Co.	Allwork
Fairbanks, Morse & Co.	Fair-Mor
Four-Drive Tractor Co., Inc.	Four-Drive
General Motors Truck Co.	Samson
Gile Tractor & Eng. Co.	Gile
Hart-Parr Co.	Hart-Parr
Joliet Oil Tractor Co.	Bates
J. T. Tractor Co.	J. T.
Kansas City Hay Press Co.	Prairie Dog
Lyons Atlas Co.	Atlas
Noble's Automatic Tractor Co.	Noble
Parrett Tractor Co.	Parrett
Plano Tractor Co.	Parrett
R&P Tractor Co.	R&P
Rock Island Imp. Co.	Heider
Russell & Co.	Russell
Sexton Tractor Corp.	Sexton
Square Turn Tractor Co.	Square Turn
Velie Motors Corp.	Velie
Waterloo Gas Engine Co.	Waterloo Boy
Trojan Tractor Co.	Trojan
Winslow Mfg. Co.	Coleman
Wisconsin Farm Tractor Co.	Wisconsin
Pan Motor Co.	Pan
Interstate Tractor Co.	Plowman

At Twin Cities

Aultman-Taylor Machy. Co.	Aultman-Taylor
Minneapolis Steel & Machy. Co.	Twin City
Allis-Chalmers Mfg. Co.	Allis-Chalmers
Convertible Tractor Corp.	Me-Go attachment
Nilson Tractor Co.	Nilson
More Bros. Corp.	Parrett
J. I. Case T. M. Co.	Case
Gray Tractor Co.	Gray
Wallis Tractor Co.	Wallis
Common Sense Gas Tractor Co.	Common Sense
Moline Plow Co.	Moline Universal
Pence Automobile Co.	Samson
Lang Tractor Co.	Lang
Feeny Farmer's Tractor Co.	Ford attachment
Emerson-Brantingham Implement Co.	E-B
New Age Tractor Co.	New Age
L. C. Erbes Tractor Co.	Ford attachment
American Ford-A-Tractor Co.	Ford attachment
Russell & Co.	Russell
Whitcomb Auto & Tractor Co.	Challenge
Acme Harvesting Machine Co.	Acme
C. O. D. Tractor Co.	C. O. D.
Tri-State Machy. Co.	All-Work kerosene
Belt-Rail Tractor Co.	Belt-Rail
John Lauson Mfg. Co.	Lauson
Stinson Tractor Co.	Stinson
International Harvester Co.	Mogul and Titan
Liberty Tractor Co.	Liberty
Staude Mfg. Co.	Staude Mak-A-Tractor
Federal Tractor Co.	Tom Thumb
Avery Co.	Avery
Huber Mfg. Co.	Huber
Wedge Imp. Co.	Auto-Pull
P. J. Downes Co.	Waterloo Boy and Beeman garden tractor
La Crosse Plow Co.	Happy Farmer
Pioneer Tractor Mfg. Co.	Pioneer
Northwestern Auto Co.	Plowman
F. R. Corcoran Co.	Knickerbocker Form-A-Tractor
Eschner Motor Co.	Guaranteed
Edward McClintock	Handy Hank attachment

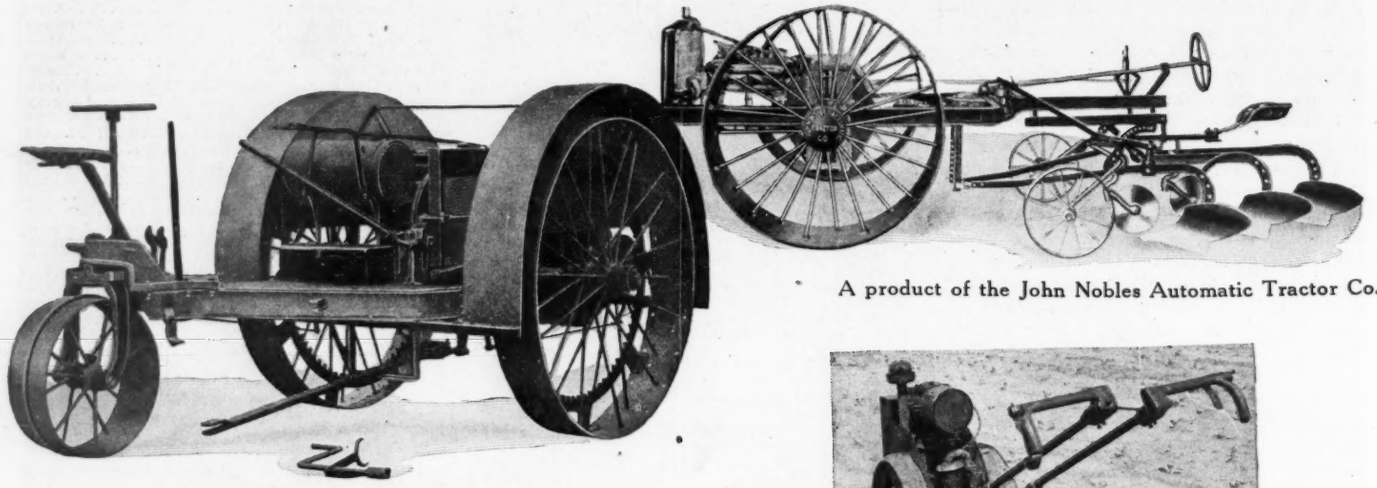
Flatcars Are Needed

KANSAS CITY, Mo., Feb. 15—More than 3000 railroad flatcars are needed right now to move the farm tractors that have been completed for several weeks from the tractor factories, where they are so crowded that all available space within the factory is used and where in some factories the stored machines are lined up on the streets in front of the factories. So acute has the situation become that some of the tractor factories will have to close within ten days if the goods are not moved. One large tractor maker in Indiana had only twelve freight cars in the month of January to move his tractors away, whereas he needed 200 cars. There is not a tractor factory but what it is being handicapped financially by the inability to ship machines. Even small tractor factories have from $100,000 to $200,000 tied up in completed machines that cannot be shipped for lack of freight cars.



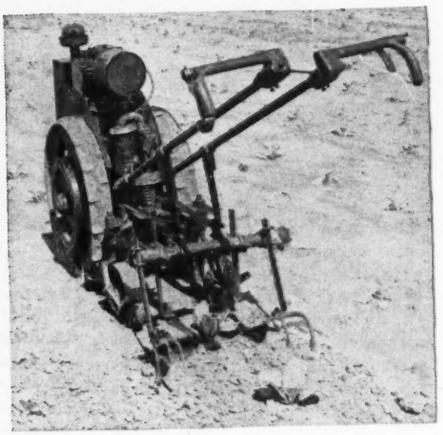
Remy exhibited an interesting electrical system with electric governor for engine

Some of the Tractors Exhibited at Kansas City

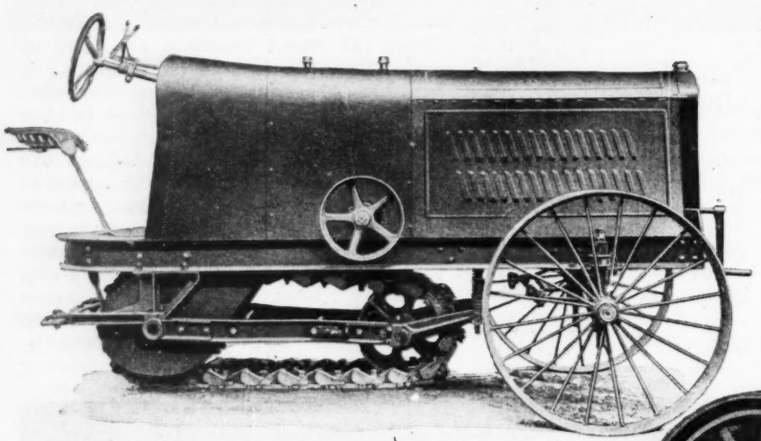


A product of the John Nobles Automatic Tractor Co.

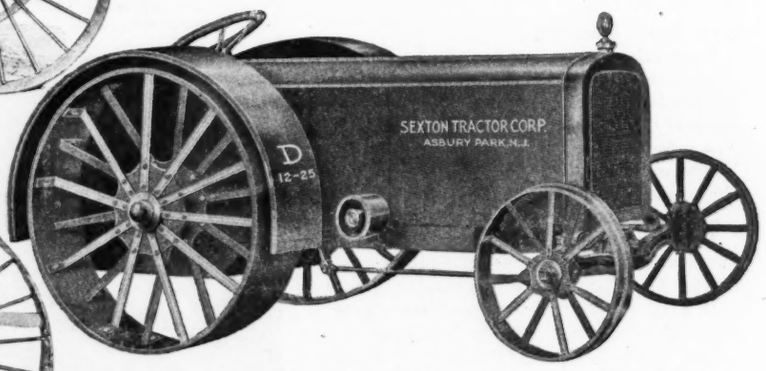
A view of the Challenge tractor



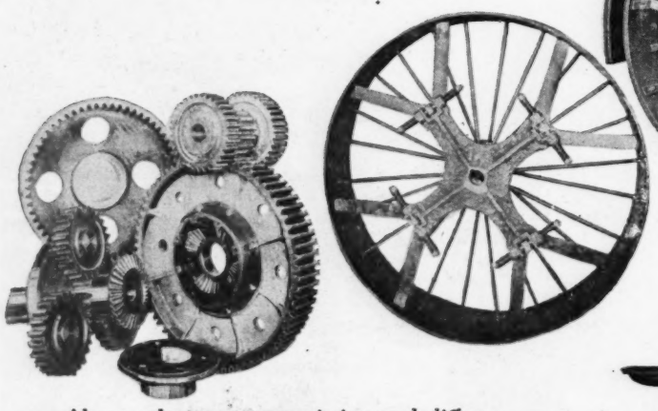
Beeman garden tractor in operation



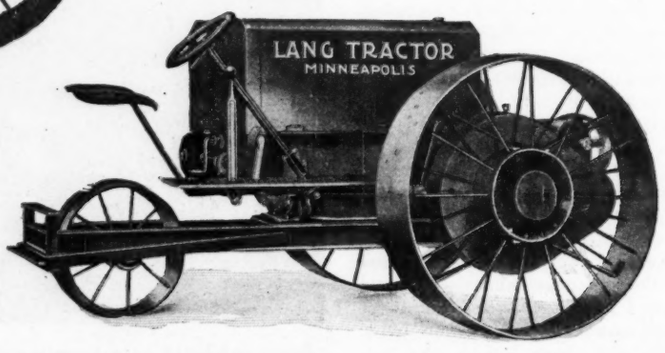
Tractor made by the Tom Thumb Tractor Co., Minneapolis, Minn.

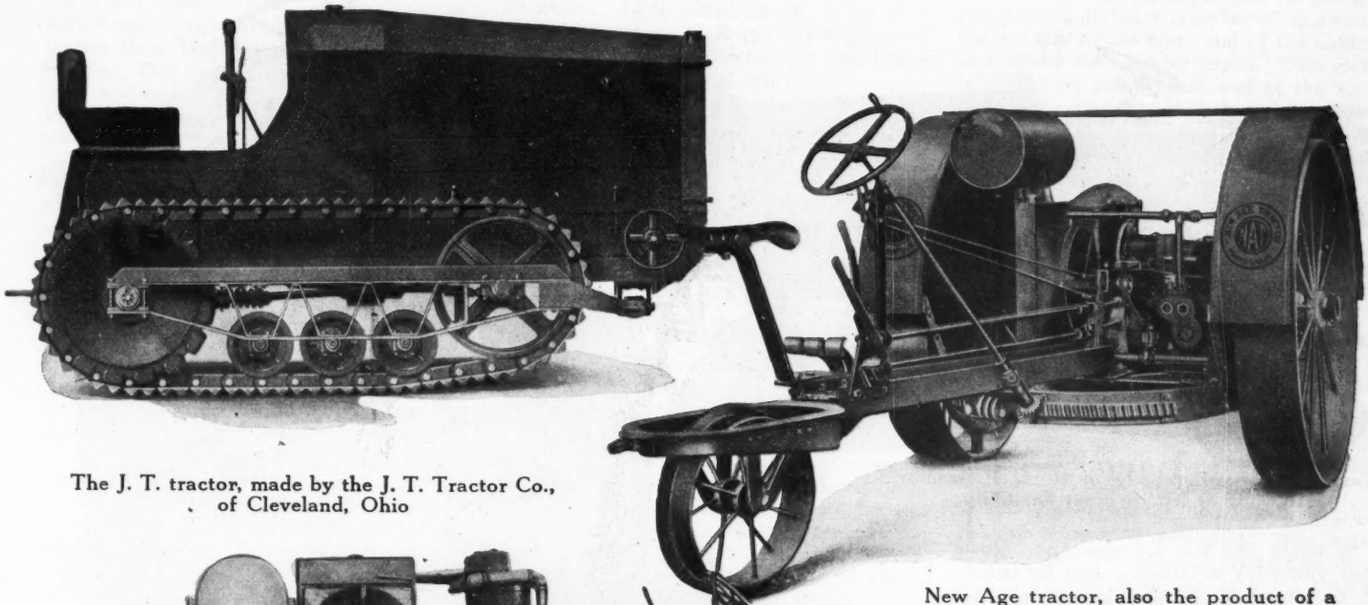


One of the Sexton Tractor Corp. models, above,, and a Lang, below



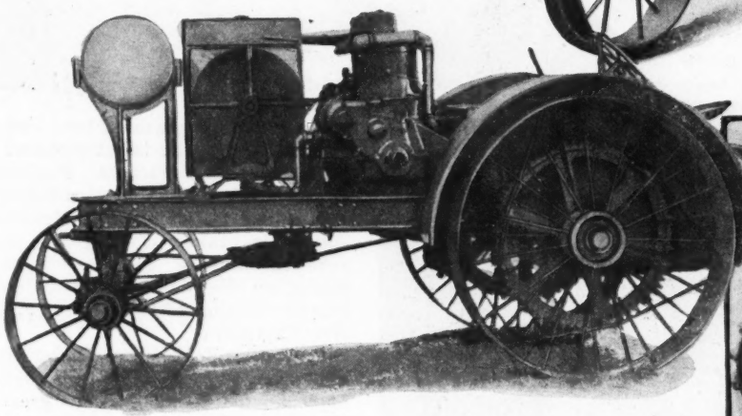
Above, planetary transmission and differential of the one unit system on the Trojan, disassembled, and view showing spider and shock-absorbing springs



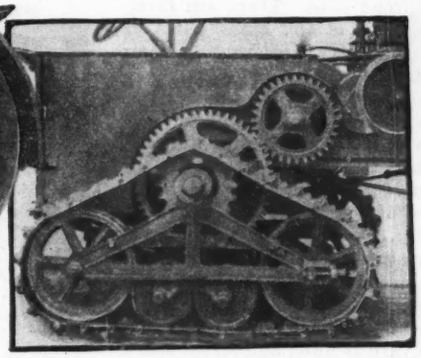


The J. T. tractor, made by the J. T. Tractor Co., of Cleveland, Ohio

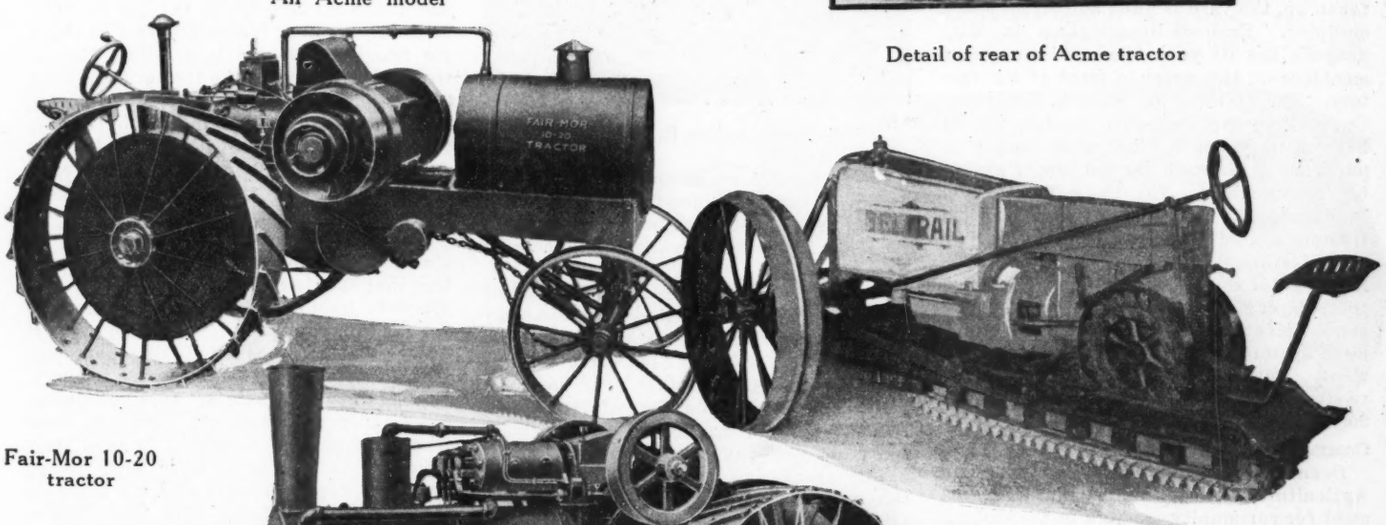
New Age tractor, also the product of a Minneapolis concern



An Acme model

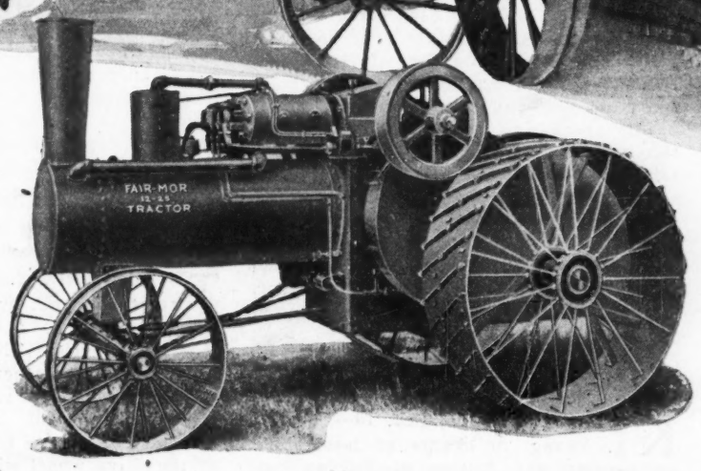


Detail of rear of Acme tractor



Fair-Mor 10-20 tractor

One of the Beltrail tractors



Fair-Mor 12-25 tractor, right

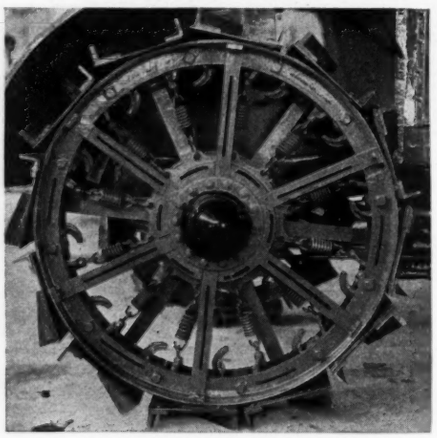
Compact low-swing body of R. & P. tractor, showing at left its great flexibility

So acute has the car shortage become that yesterday a telegram was forwarded to Secretary W. G. McAdoo asking that tractor makers be given consideration in the use of railroad cars. There are farmers in Southen Texas and other parts of the South that to-day are needing their tractors for farming but cannot get them. The production of the 1918 crop already is suffering because of lack of machines. Soon the spring will move northward through the great grain belt and tractors will be needed in increasing quantities. Unless the railroad situation clears up, the spring crop will suffer.

The Avery company, Peoria, Ill., has several machines ready for shipment that have been awaiting shipment a month. All available storage space in the factory is taken up, the yard is filled and street space occupied. Emerson-Brantingham in Minneapolis has its yard filled and strings of machines on the street in front of the factory. The Minneapolis Steel & Machinery Co., making the Twin-City tractor, has its huge factory space filled with completed parts and lacks room for the proper assembly of machines. The Gray Tractor Co. in Minneapolis has its yard well filled with tractors crated for France but lacks railroad facilities to move them. The Parrett Tractor Co. in Chicago is well situated for shipping and has not suffered to the same extent that others have but has a large quantity of tractors awaiting shipment. Rumely at Laporte, Ind., had only twelve freight cars in January and needed 200. There is no relief in sight.

Community Tractors

Dean W. H. Jardine of the Kansas State Agricultural College, Manhattan, Kan., argued for community tractors in the eastern part of Kansas, where there are many farmers that, economically should not own a tractor but where one tractor could do the work of five or six of such. At present the farmers are opposed to the idea, but the State Council of Defense has Dean Jardine working on the job. He further recommended that tractor makers send one or two of their machines, or as many as they can spare, into the state for spring plowing and announced that the State Council of Defense will arrange to secure land which can be plowed at a good price per acre. A further recommendation was that tractor dealers in the state use their demonstrating machines for contract plowing at a stipulated price per acre, the State Council of Defense securing the land to be plowed.



P-T wheel used on R. & P. Tractor

Kansas has to plant 24,000,000 acres of crop this spring and has approximately 70,000 fewer farm laborers than a year ago. Tractors must be used for the work. In the hot month of July over 9,000,000 acres must be plowed for winter wheat, because land plowed in July generally yields 50 per cent greater crop. There is hardly another part of the country where the tractor is more needed than in the winter wheat belt of Kansas. The weather is too hot for the horse and often the ground too hard. Kansas has at present 6000 tractors, 2000 of which were sold last year. Tractors are needed for the 35,000,000 acres that Kansas has to harvest this year. The 10-20 tractor is the average size used in the state.

To Test Tractors

KANSAS CITY, Mo., Feb. 15—Prof. G. A. Young, in charge of mechanical engineering and testing at Purdue university, Lafayette, Ind., speaking before 200 tractor engineers here Wednesday night, outlined the broad plans of Purdue for testing farm tractors. The University is the official testing laboratory for railway apparatus, and new designs of brake shoes, air brakes, draft gears, etc., must take the Purdue test before they are placed on the market. He addressed the tractor meeting of the Society of Automotive Engineers.

Professor Young has similar ambitions with regard to Purdue and the farm tractor field and to-night offered his great testing laboratory for the use of tractor makers and others manufacturing engines for tractors. The testing laboratory that is ready for tractor testing is larger than the entire building housing the tractor show here. The Purdue aim insofar as tractors is concerned is to aid in bringing out by test information as to those designs of tractors that are theoretically right, that are practically right and that are commercially right.

Engines will be tested for power on standard gasoline and also on the special fuel that the maker may desire tested. The complete tractor will be tested in the field for drawbar pull, etc. In the engine test every necessary record will be taken, such as air velocity for cooling, water temperatures, oil temperatures, fuel efficiency, power output, torque, etc. Already some tractor makers have decided to send their machines to Purdue to have them tested and some engine makers also are going to take advantage of the offer that Purdue has made.

R. & P. Tractor

TWO distinctive features mark the new tractor put out by the R. & P. Tractor Co,. Alma, Mich.—the rear axle and the P-T pad wheels. The axle differs from conventional construction in that there is a large internal gear reduction just in front of the differential. This eliminates the necessity of a large bull gear near the rim of the drive wheel with its attendant disadvantage of being exposed to mud and

dust. Otherwise the axle is the standard Torbenson internal gear type with speed reductions in the differential bevels and in the final internal gear drives at the wheels. This construction permits a compact arrangement, the benefit of a solid I-beam load axle, and all gears running in oil-tight cases protected with felt washers.

The P-T pad wheels are the invention of two Italian engineers, Pavesi and Tolotti, and are the same design as employed on military tractors in the Italian army. This wheel is the self-laying track type and differs from other patents in that the pads are not pivoted in the wheel rim, but are held against it by springs and suspended between two rolls. There is a maximum area of two pads on the ground at the same time, and the wheel rim simply rolls over the track on the pads without causing them to move, thus avoiding any milling or scraping in going over macadam or asphalt pavement. Incidentally, there are no rubbing or sliding movements, but only rolling movements between pads and wheel rims and pads and rollers.

By the increased efficiency of the P-T tyep pad wheel over the ordinary friction wheel, a much smaller-diameter drive wheel, 40 by 11 in., can be employed and allow a low center of gravity. The same results are accomplished with the 40-in. drive wheel of the P-T design as with a 60-in. wheel of the conventional type. The front wheels are 32 by 6 in.

Features of Interest

Other features of interest are the drawbar suspension, which is attached to the frame by four members, equally distributing the load strain throughout the chassis. A compression coil spring absorbs shock and vibration between the tractor and load, and the drawbar can be adjusted to any required height between 10 and 20 in.

To enable the pilot to maneuver into proper alignment with power-driven apparatus on the farm, the power take-off is located on the same side as the steering wheel. When the power pulley, which runs at the same speed as the engine, is not in use, as in road and field work, it can be removed and the shaft covered with a cap.

The flexibility of the chassis, through a pivoted front axle, permits a maximum angle of 35 deg. distortion, and even at that extreme, locomotion is safe because of the low center of gravity. To effect simplicity and eliminate all dispensable gages and connections, the fuel tank is located under the hood at the rear of the engine with a large filling cap in the top of the hood which facilitates determining the amount of the fuel in the tank. The carbureter is equipped with a Wilcox-Bennett air cleaner for dusty work in the field and on the road.

The tractor weighs 3500 lb. and has a wheelbase of 70 in. and a turning radius of 11 ft. Dimensions are 60 in., height; 65 in., with; and 108 in., total length. The drawbar horsepower is 12, and the belt horsepower, 20 at 900 r.p.m. Four speeds, three forward and reverse, are available. They are 1.35, 2.35, 4.35 and 1.35 m.p.h. respectively. A Waukesha engine, 3¾ by 5¼ in., is used. The governor also is a Waukesha. Ignition is by Eisemann magneto. The transmission is Fuller. Cooling is from an armored radiator of 9-gal. capacity. The tractor is fitted with a hitch that is adjustable from 12 to 20 in. in clearance. It is called the R. & P. from the initials of F. W. Ruggles, president of the Republic Motor Truck Co., and Channing Parsons, who originated it.

The R. & P. Tractor Co. was incorporated for $500,000 and will manufacture in a wing of the Republic Motor Truck Co. plant until a new plant is built. The officers are: President, F. W. Ruggles; vice-president and general manager, Channing Parsons; secretary, Harry Green; and treasurer, T. A. Burt.

New Fair-Mor

FAIR-MOR is the new tractor named for Fairbanks-Morse & Co., the large builder of railroad supplies, including a line of gasoline engine trucks for section work, which have been marketed for many years. The Fair-Mor tractors have been made for several years but largely for export and only now have they been introduced into the great Mississippi farming belt. There are two models, both of which burn kerosene and both of which use a twin-cylinder engine of low-speed design, intended for speed of 400 to 600 r.p.m.

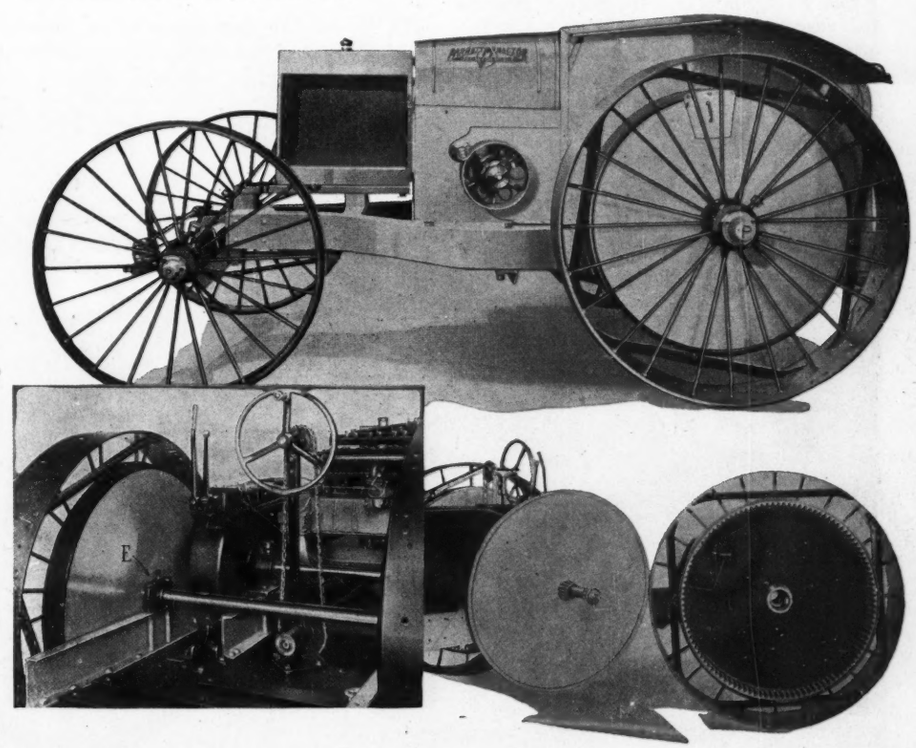
The larger model, a 12-25 job for three plows, is built as an imitation of a steam traction engine, with the cellular radiator as the body, the twin-cylinder engine lying on top of the rear end of the radiator and the gearset and fuel tank forming the firebox. The rear wheels are 56 by 18 in. and the engine cylinders 6.5 by 8 in. The radiator is closed at its front end, and the air enters through the rear and travels forward, escaping through the funnel on top. This air circulation is maintained by the exhaust, which escapes at the front of the radiator and also in the base of the funnel, thus creating an air draft.

No conventional kerosene carbureter is used, but the kerosene pumped by plunger pump into a globular chamber of about carbureter size at the front end of the engine, or close to the cylinder heads. This globe is heated by the exhaust and as the kerosene is sprayed into it, hot air also enters to take up the kerosene. On its way to the cylinders a current of cold air is added to increase the power. A butterfly throttle controls the flow of mixture. The radiator capacity is 100 gal. and the total weight is given as approximating 5500 lb.

The smaller Fair-Mor model is a conventional design but is much the same in principle, using a twin-cylinder engine 6 by 7 in. which runs at 600 r.p.m. Its rating is 10-20 and like its larger brother it has large drive wheels with inclosed drive. It has direct pulley drive for belt work.

Plano Tractor

THE Plano Tractor Co., Plano, Ill., began tractor development two years ago and has just started production on a new four-wheel design using a 4¼ by 5½ Buda engine, which drives through a Plano design of gearset to the rear drive wheels, which are 42 by 12 in. There is a total reduction between the engine and rear wheels of 49 to 1. The front wheels are also large diameter, and having the frame very narrow at the front gives the job good maneuvering ability. The frame is cast steel and almost yoke shaped with the narrow end, or stem, of the yoke in front. The weight distribution is such that 30 per cent is over the front wheels and 70 over the drives. The drive wheels carry large manganese steel gears which are intended to be run without lubrication and are guaranteed for two years. In the two-speed gearset cast gears are used and shafts are carried on Hyatts. The radiator is in the rear of the engine and just



New Parrett internal-gear-drive tractor. E indicates eccentric bushing, permitting change of gear ratio. At center is inner cover of drum inclosing the final drive

to the left of the tractor operator's seat.

Use is made of a special water air filter made by the company. It is inclosed in a rectangular box which is two-thirds filled with water and is kept at this level from the radiator system. The box is divided horizontally into upper and lower halves by a metal plate. Air enters the lower half and in passing through the water is led through a devious course by a series of vertical baffle plates attached alternately to the top and the bottom of the compartment. Kerosene is used, a double-bowl Kingston carbureter serving.

Foote Transmission

USING a live rear tractor axle with 60-in. tractor wheels and keeping the pressure low on the teeth of the necessary gearings was the incentive of Foote Bros. Gear & Machine Co., Chicago, in the design of its new gearset that was shown for the first time at the Kansas City tractor show, incorporated as it was in the new Trojan tractor. To accomplish this end John B. Foote, president of the company, has made use of an extensive system of gearing and makes use of a planetary system in conjunction with a sliding system. The set affords three forward speeds which in miles per hour approximate 1.5, 2.12 and 4.3. By changing a set of two gears which are outside of the case but yet inclosed it is possible to change the entire speed ratios and give a higher schedule of speeds as 2.2, 3 and 6 m.p.h. The cost of an extra set of these two gears is $16, and by this additional investment the farmer has a tractor with a range of six forward speeds.

To change this set of gears calls for removing a plate on the side of the gearbox and not more than 15 min. work. An increase in drawbar pull of 50 per cent is obtained by this change of gear ratio.

The Foote unit is more than a gearbox and rear axle combination and has a forward extending cradle which supports the engine, constituting in reality about seven-eighths of the tractor frame. The front end of the gearbox ends in a bell housing to fit the corresponding end on the crankcase, S. A. E. standards being used.

All gears in the set are .15 to .25 carbon forgings, and are heat treated excepting the ring gear on the differential, which is a semi-steel casting. The Foote company plans to manufacture this gearset in two models, one for three-plow jobs and the other for six-plow jobs.

J. T. Tractor

THE J. T. tractor, the first model of which was brought out two weeks ago, is a creeper design with a long creeper on each side and no wheels. Fifty-seven in. of creeper length is in constant contact with the ground. The creeper width is 8 in. Each creeper rides on a train of idler pulleys and is driven from a large rear gear that in turn receives its power through an internal-gear drive entirely inclosed. Steering is by use of internal brakes acting on the differential, one brake on each half of the differential.

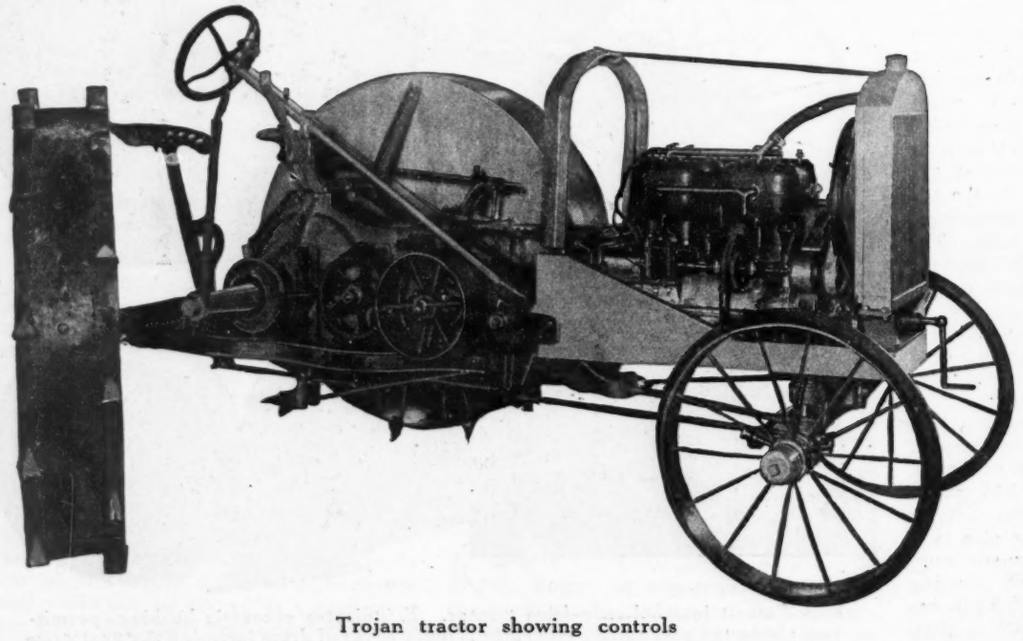
The four-cylinder, block, valve-in-the-head Erd engine burns kerosene, the J. T. carbureter working in conjunction with an exhaust-jacketed manifold. With the engine at 800 r.p.m. the three forward speeds are 1.25, 2.5 and 5 m.p.h. These changes are taken through a gearset made by the Detroit Gear & Machine Co. The jackshaft is made by the American Ball Bearing Co.

The J. T. Tractor Co., Cleveland, Ohio, has a three-story plant which it will use for assembling its tractors and has hopes in six months of producing five machines per day. George P. Comey is president; J. J. Tracy, chief engineer; H. L. Lance, general manager; and C. E. Grove, sales manager. The company has not yet built up its distributing organization.

Coleman Worm Drive

ONE of the few worm-drive tractors outside of the Fordson, the new name for the job made by Henry Ford and his son Edsel, is the Coleman, of which perhaps thirty have been made to date, although development work was started several years ago and manufacture begun a year ago. The worm mounted on top of the wheel in the rear axle is used in connection with a two-speed gearset. The worm and wheel give a reduction of 50 to 1. The wheel is large, 26 in. in diameter, and the worm 4 in. in diameter, is so designed that six teeth on the wheel are in constant mesh with the worm. The worm is mounted on Timken bearings and special provision for lubrication used by way of extra pipe feed, in addition to regular supply of lubricant in the case. The live rear axle is carried on Hyatts, as is the differential.

The engine is a four-cylinder block Erd. Forged gears are employed in the gearset. The rear wheels are relatively small, 42 in. in diameter on the small model and 46 in. in diameter on a larger model. It is made by the Winslow Mfg. Co., Kansas City, Mo.



Trojan tractor showing controls

CALIFORNIA TO SHOW TRACTORS

Davis, Cal., Feb. 15—A tractor demonstration will be held on the University of California farm April 17-19 under the auspices of the California Tractor & Implement Association, organized for this purpose. A special effort will be made to show the broad scope of modern power-farming and the versatility of the modern tractor. The exhibits will include tractor tools, such as plows, disks and drag harrows, cultivators, sub-soilers, scrapers and checkers. Practically every make of tractor sold on the Pacific Coast will be shown. The use of the tractor as a stationary power plant also will be demonstrated, and tests will be conducted as to actual drawbar horsepower and short-turning ability in plowed ground as well as on ordinary surfaces. The tests will be under the direction of Prof. J. B. Davidson of the University of California, and Eugene Smith will manage the demonstration.

A 1918 TRACTOR SHOW UNCERTAIN

Kansas City, Mo., Feb. 15—The question of definite arrangements for the 1918 tractor demonstrations has been delayed by the committee which has this work in charge for the National Implement & Vehicle Association, which conducts the demonstrations. The committee held a meeting here this week and decided that because of the congested conditions of the railroads and the uncertainty of securing adequate railroad equipment for shipping tractors, that it was impossible to definitely decide on any demonstrations. Up to this time no time or place for holding such demonstration has been selected, although it has been decided to hold a tractor demonstration with rigid rules governing same so that complete information regarding the performances of the different machines can be had and an official report published. If conditions change, and demonstrations are possible, they will be held.

It is certain that the demonstrations will not go to Fre-

mont, Neb., this year as they have in past years. Cleveland, Ohio, has been discussed as a probable center for the demonstrations, but it is very questionable if sufficient land can be secured for plowing.

A delegation from Salina, Kan., an enterprising city in the western half of the state, advanced the claims of that area for the tractor demonstrations. It is also understood that some centers of Dakota are anxious to secure the demonstrations. There has been some question that these demonstrations should go to the Twin Cities, but the ground is a little rough and hilly for the desired demonstration, and it is questionable if necessary acreage could be obtained.

ST. LOUIS SHOW OPENS

St. Louis, Mo., Feb. 18—The eleventh annual St. Louis show opened tonight with an exceptional attendance of dealers from the South and Southwest, where the highest degree of optimism obtains as to the season's business. This year the National and Allies' flags predominate in the decorations of the Exhibit building, once the Southern Hotel but now opened as a permanent industrial exhibit and convention building. The space limitations prevented an exhibit of trucks, but most trucks dealers are keeping open house at their salesrooms and some have rented nearby stores for exhibits.

On two afternoons soldiers in uniform will be admitted free and the dealers and employees at the show who are members of the Home Guards will wear their uniforms. On two other afternoons special arrangements will be made for women. All afternoons will have a matinee price scale of 25 cents and war tax until 6 p. m.

The Biddle and Maibohm cars are being shown for the first time in St. Louis. The Cole is not in the show but is on exhibit at Hotel Jefferson. Two special luncheons will be held during the show. One will be Tuesday noon, when Ray W. Sherman of Motor World will speak, and the second Wednesday noon, when E. LeRoy Pelletier, advertising manager for the Reo, will be the speaker. Both luncheons will be open to members of the local organizations and visiting dealers.

CANADIAN ORDER FOR FORDS

Dearborn, Mich., Feb. 18—Henry Ford & Son have closed a contract with the Canadian government for the manufacture of at least 1000 tractors at cost, and they will be sold to the farmers of the Dominion at the purchase price plus freight charges. This order has priority over any individual orders from Canada. Delivery of these tractors is expected to be completed before April 1.

REO DISTRIBUTES COAL

Lansing, Mich., Feb. 15—The Reo Motor Car Co., after having to shut off its coal supplies for a day and a half, again is distributing coal to its employees at cost. The company's record of disbursements for twenty-eight days is 37,558 bu., which brought relief to 5852 persons. On one single day the company distributed 139 tons of coal in bushel lots, and on another day 518 persons were tided over.

To Ship Road Materials

Railroad Embargo Is Lifted to Further Construction of Necessary Highways

Bill Would Employ All Interned Aliens in Work

WASHINGTON, Feb. 18—Special telegram—That national military road building is to be pushed this summer through the co-operation of the railroad administration is made certain by the announcement to-day that Director McAdoo has notified C. P. Coleman, chairman of the executive committee of the American Association of State Highway Engineers, that the railroads will carry material for building such roads. The railroad administration will co-operate with the secretary of agriculture by transporting materials for the construction of national highways, designated by him as military or economic necessities, whenever the equipment is available and not needed to move supplies for the army, navy, shipping board or other Government activities. This means that the priority order which discriminated against using railroad cars for shipping road-building material is over-ruled so far as National highways designated by the secretary of agriculture as military or economic necessities are concerned.

The use of enemy aliens for road construction is asked for in a bill now before the committee on military affairs, introduced by Congressman Moore of Indiana. This provides for employment of all interned enemy aliens as agricultural laborers or for public highway construction.

$50,000,000 for Tanks

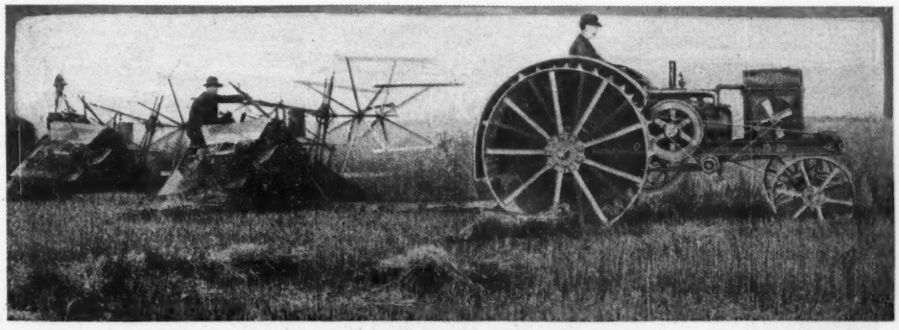
WASHINGTON, Feb. 18—Special telegram—A very great increase in the tank-building program is indicated in the appropriation by Congress of $50,000,000 for the purchase of tractor tanks ranging from 12 hp. to 125 hp. The tanks which will be ordered already have been tested by officers of both the American and Allied armies.

TO FURNISH U. S. POWER UNITS

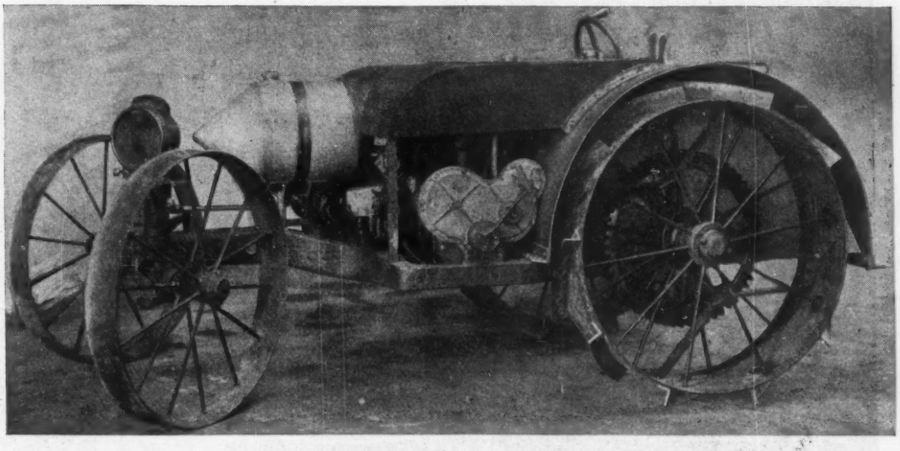
Sheboygan Falls, Wis., Feb. 16—The Falls Motors Corp., Sheboygan Falls, Wis., maker of passenger and commercial car, tractor and airplane engines, has accepted a Government contract for 2000 motive power units for military trucks, deliveries of which are to begin early in March. It is stated that the initial lot of 2000 engines will be shipped to the Kissel Motor Car Co., Hartford, Wis., which is executing a large contract for military trucks. The company some time ago accepted a contract for furnishing the cylinders and other parts for 5000 airplane engines for Curtiss and this is being filled rapidly.

IT IS MAJOR LOZIER NOW

Washington, Feb. 16—Harry Lozier, former president Lozier Bros. Co., Cleveland, Ohio, and well known as the founder of the old Lozier Motor Car Co., has been commissioned a major in the procurement division of the Ordnance Department.



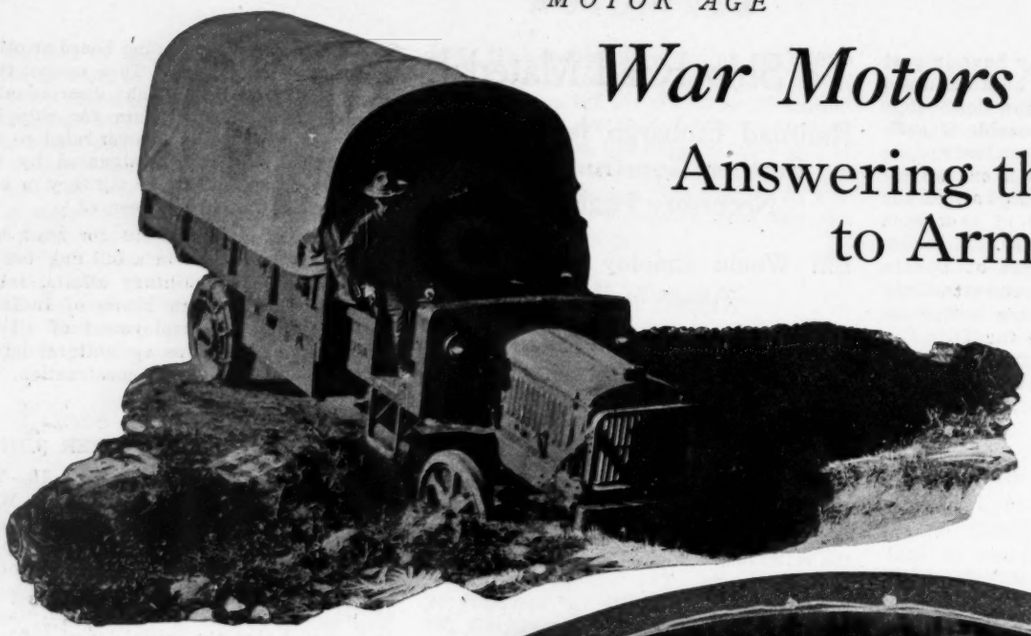
C. O. D. tractor working in the harvest field



Left-hand view of Plano tractor

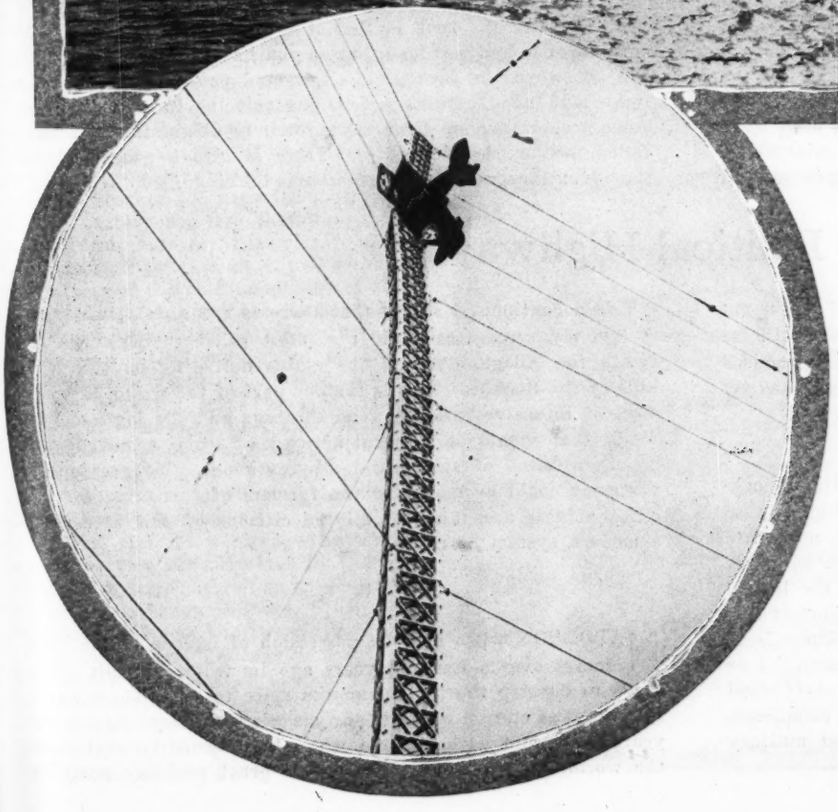
War Motors in Brief

Answering the Call to Arms

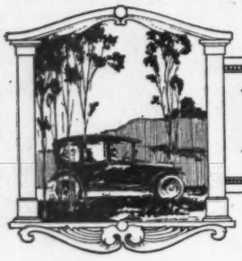


Here are shown our own U. S. A. war trucks undergoing tests preparatory to entering the ampitheater of war. Winter makes going in the tests rough, but hazard and smooth road alike are negotiated with success

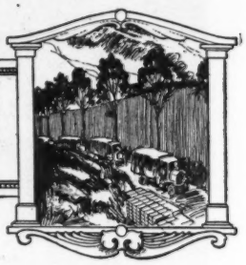
Peace and war mingle in this landscape, which, in reality, is not silent but accompanied by the insistent whir of the engine in the military airplane which, in this case, is the bird in the air. After the war a plane soaring above may be true to peace and the business of peace, but just now it is typical of war because it is to the airplane one turns for victory in war



When this British seaplane hit the steel girders of a wireless tower more than 300 feet high it was caught firmly by the lattice work and the pilot fell unconscious on one of the wings. The engines were wedged so the machine stuck out at right angles. Bluejackets who were painting the tower rescued the aviator



EDITORIAL PERSPECTIVES



The Kerosene Camouflage

CAMOUFLAGING is still rampant in tractordom so far as the burning of kerosene efficiently is concerned. The wild oats of kerosene are being sown recklessly, and the bitter harvesting awaits the transgressors of to-day. The situation is much more serious with the farmers than is imagined. Kerosene is far from being so relied upon as many tractor makers would have you believe. The facts are that it is not being burned efficiently, and farmers tell by their bank book that it is cheaper to use gasoline than kerosene. Recently one tractor maker, who sold his tractor and advertised it as a kerosene-burning tractor, recommended to a farmer that he use gasoline, confiding that he would not get the power out of the engine with kerosene and that difficulties would follow in lubricating the engine as well as in cooling it.

WHAT might be termed the second stage of camouflaging with regard to burning kerosene is going the round in many parts, namely, the so-called complete solution of the problem with the exhaust-jacketed manifold. At the Kansas City tractor show this design of manifold persistently was argued by not a few company officials as the final word in kerosene carburetion. It seems too bad that these overzealous men will so overstate the case unreasonably. They miss the goal they are aiming at when they talk that way. If they would give this design of manifold its due credit and stop there, the case would be stronger with the farmer, but in their stupid use of the word "absolutely," which should be eliminated from the salesman's vocabulary, they kill the goose that laid the golden egg.

BURNING kerosene is a two-fold job. First you have to break the kerosene up, and heat generally is used to do this, but if you use too much heat you expand the mixture too much and you cannot get enough into the cylinders and the power is cut down. Thus the very thing, heat, that you are counting upon so much, is your undoing. It spoils the whole scheme.

SECOND, you must get power out of kerosene or there is not any sense in using it. To get power then you must get the mixture into the cylinders as cold as possible, and not as hot as possible. The problem then becomes more than mere heat. If you want heat you can get it as high as 1000 deg. Fahr., at which kerosene is a veritable dry gas which will not condense in its passage to the cylinders, but with such a temperature you cannot get enough into the cylinders to give the power needed. With such a gas you can get all the flexibility desired but you are lacking in power.

THERE is another aspect in conjunction with burning kerosene that could be incorporated to advantage with jacketed manifolds, namely, that you must have some form of heat control. Here is the reason: When you have the throttle wide open and the tractor is working at its full load you have the most heat, but it is the very time you need the least heat. Then there is the other aspect, namely, when the throttle is closed, the velocity is cut down and you have less heat, but this is the very time when you need more heat, because when you have not the velocity then you must have the heat to prevent the condensation. Then, what you need is some control that regulates the heat so that it is cut to the minimum with open throttle and full load, but so you have all of the heat you can get when the throttle is closed and you are running on a light load and there is a low gas velocity in the manifold. Some tractor makers have endeavored to attain this but have failed in the execution of it. There is here a good field for the inventive genius of the kerosene-burning field.

The Political Highway

WE vainly imagined that the honest politician had led us out of Egypt in this highway pilgrimage, but we are still far in the desert without even distant glimpses of the promised land. The eventful Moses, who will lead us to the light, has yet to be found. Cross-state highways are still political.

THESE war days are not fit moments for such political slacking. It is unpatriotic to-day to lay out a highway so smeared with political patronage that the national needs are lost sight of entirely. We must have national roads, but their first claim to national significance is that they are the logical channels for commerce and at the same time the shortest and if possible the most valuable as military highways. There is no money to-day for sentimental roads, and no road material or labor to build such. They must be placed on the shelf until the reconstruction work following the war has been completed, and we have also built those great commercial and military highways which our Nation needs.

IT is a continental shame that there is not an all-year stone highway across the world's greatest granary which lies between the Alleghanies and the plains bordering on the foothills of the Rockies. This is the one part of the world, in these days of intensive farming, food shortage and the high cost of foods, that should be a literal network of stone, cement, brick or other forms of substantial all-year roads. No greater investment could be made for the farmers of this area, for the cities of this area and for all the citizens of this area than a modern system of roads.

NAPOLEON when he took possession of islands in the East Indies over a hundred years ago immediately built great roads to develop the tea, sugar and spice trades. Those roads still stand as eternal memorials to his wisdom. Here we are 100 years later, and with an area whose soil fecundity challenges the world, yet we have not the first great roadway north or

south, east or west that threads its fertile acres. We are putting the finest motor cars into this zone; it is taking the finest trucks; we will put a million tractors into it, and yet the one economic essenial, the all-year road, is lacking. As a war measure an all-year road system should be started in this lap of the continent.

Carbureter Air Cleaners

AT the Kansas City tractor show last week, a large engine manufacturer, and he makes one of the best tractor engines, stated that if the dust cannot be better taken out of the air used in the engine the internal combustion engine will prove a failure in the tractor field. Practically every tractor at the show had an air cleaner attached, but some of them were makeshifts and installed to meet the inevitable question of the farmer and dealer. Have you an air cleaner?

RECORDS show that piston rings literally have been cut to a quarter their regular size in the alkali country in three weeks. Such wear is not met with in motor trucks in several years of service. You do not meet with such wear in a motor car in its entire life. The alkali dust literally lives on the iron of the rings. The top ring is cut most, then the next, and wear is proportional down to the bottom ring. Then the ring gets so worn the power is gone, and the tractor is useless for its heaviest duties.

THE last chapter in air cleaners has yet to be written. There are good designs, but they have to be improved upon further. If it were not for the existing designs the number of tractors that are discarded in the alkali country would have been much greater. The present air cleaners will remove the heavier particles of this destructive dust, but the finer and almost invisible particles pass through. These particles are innocent outside of the engine but veritable vipers within. This dust when moistened is so slippery between your fingers that you might imagine it a lubricant, but when subjected to the heat of the cylinder it becomes a hard scratching bit of stone.

INVENTIVE genius has an ideal opportunity in the development of the 100 per cent air cleaner. The engine makers are demanding it. They must have it. The tractor makers must have it. There is not much objection as to weight or size. When a part is so necessary, volume and weight are secondary considerations if it functions perfectly.

Starting Car in Cold Weather

Results of Tests to Eliminate Troubles

CLEVELAND, Ohio, Feb. 16—In cold weather, the starting battery is only half as efficient and the starting motor less than half as efficient as in warm weather. That many cars are not equipped with starters and batteries which will start the engine properly in cold weather most motorists have realized, but it has remained for O. W. A. Oetting of Willard Storage Battery Co. to make a scientific test of the reason and the best method for overcoming the trouble. As told in the paper presented by Mr. Oetting at the Cleveland section of the Society of Automotive Engineers last night, most of the troubles of cold weather starting are avoidable if all the effects of cold temperatures have been anticipated by the designer, but the proper application of the starter and the battery will eliminate most of them. In cold weather the capacity and voltage of the battery are less than they are at normal temperatures. Likewise, it is much more difficult to start an engine because of the effects of the cold temperatures on the lubrication and upon the carburetion of the fuel. In addition, Mr. Oetting's tests have shown that efficiencies of electric starting motors are considerably lower at the low cranking speed than are encountered under these cold weather conditions.

After a long series of tests with many types of engines and starting apparatus in a refrigerator, Mr. Oetting has reached the following conclusions:

1—The size of a storage battery for starter service is determined by the power required to start and roll an engine at some reasonably cold temperature, 10 deg. Fahr. at a sufficient speed to cause ignition.

2—Starting troubles may be due to various causes, viz., lack of battery capacity, improper application or lack of size of the starter, viscosity of lubricant at cold temperatures, faulty ignition, poor carburetion, or an inferior grade of fuel.

3—A good design of engine and its accessories should take into consideration all of these causes and provide for satisfactory starting at a temperature no higher than 10 deg. Fahr.

4—At 10 deg. Fahr., the available battery capacity is approximately between 10 per cent and 40 per cent for the low cranking speeds encountered at these cold temperatures. A design of motor should be used which gives better starting torques and higher efficiencies at these low speeds, even if it is necessary to sacrifice the speed at which the motor spins the engine under normal temperatures.

6—A convenient double reduction gearing between the starter and the engine flywheel can be made that will give better starting characteristics under cold weather conditions than a single gear reduction.

7—A good quality of lubricating oil and a good grade of fuel are requisites for satisfactory starting.

8—As there is a wide divergence in the design and manufacture of the various automotive engines, each application should be tested separately to determine the power that is required to start it under cold weather conditions.

WAR SERVICE BY TRUCKS

New York, Feb. 15—Co-operation between motor truck and boat is demonstrated in the territory adjacent to Long Island Sound. Products are carried from the interior of Connecticut by motor trucks, which deliver goods at the docks of the Starin-New Haven line. Transportation is by water then to New York, and the following day the goods are loaded on a through car. This method eliminates the transfer car and space in a freight house.

Trouble Proof

Have you ever met the owner
Of the motor car superb,
Of the motor car that never
Has been rumored to disturb?

It has seen a season's service,
And its boastful owner swears
That he's never spent a penny
For adjustments or repairs!

Clutch, ignition, carbureter,
Differential, axle, tires
Haven't troubled him, moreover
None of gas his car requires!

There are many on the market,
And they're never known to fail,
So assures the sly young chauffeur
Of the little Irish Mail!

—John B. Terns.

More Trucks and Standardization

Two Great Needs of American Expeditionary Forces in Frances Cited by Transport Officer

WASHINGTON, Feb. 15—Contrary to the general impression very little cross-country driving is necessary in France. Trucks, more trucks and still more trucks are the requirements of the American Expeditionary Forces. Greater standardization by makers of small parts on trucks, combined with more simplicity and less elaborate design, are the demands of our Army abroad. These and many other interesting and important observations were made here to-day by Major Barrett Andrews, assistant chief in charge of operations of the motor transport service under Colonel Francis S. Pope with the American Expeditionary Forces in France. Major Andrews, serving directly at General Pershing's headquarters, is in this country for a brief stay, giving to Army officers here the benefit of the experiences learned by our Army abroad.

Of particular importance is his message that all the motor services of the American army abroad has been pooled, except the aviation trucks, and is now entirely under the direction of Brig.-Gen. H. E. Rogers, chief Quartermaster Corps, A. E. F., who operates directly under General Pershing. General Rogers has so organized the motor transport service as to eliminate waste, duplication of effort, red tape and loss of time, with the result that there is a saving of 15 to 25 per cent of truck service. For example, under the pooling system, if the trucks of the Engineer Corps are idle, they can be used by the artillery for hauling ammunition; if the trucks of the artillery are idle, they may be used by the Quartermaster Corps for carrying supplies, while under the old system whereby each corps controlled its own trucks, they could not be used by the various other divisions without considerable red tape, and frequently not at all.

French Roads Maintained

The popular opinion in this country that the roads of France are destroyed and that all driving is across country is entirely untrue stated Major Andrews. The roads of France are maintained at a very high standard. Old trucks and old truck bodies are used for road work. The Singalese are detailed in crews much like the section gangs of the American railroads, and are stationed at intervals along the highways. The trucks carry crushed rock to the stations of the road crews and to other points along the highway, working on certain schedules, and the workers, operating usually directly after the roads have been shelled, make their repairs promptly. In some instances they work under shell fire.

Motor trucks carry supplies and ammunition within 1200 yd. of the front line trenches. The preference in motor trucks by the expeditionary forces, as expressed by Major Andrews, is for 3-ton and 5-ton trucks with the regular war body. The reasons are that the regular body is more adaptable and under the pooling scheme is really necessary, as the trucks are used constantly for diversified work. General Rogers believes it better to have many supplies moving along slowly but steadily rather than the limited supplies that could be hauled by the speedier and smaller trucks. The highways are divided for use so that the trucks take the outside while the passenger cars take the center and the space is limited, further making the less speedy and larger trucks more desirable.

Standardization is found particularly important at every turn. Requirements for the military trucks include power, light traction effort, four-speed gearset, great strength of all transmitting members, security by use of double ignition, extra lights with minimum of exposure, bumpers front and rear, means of towing and in general all qualities that stand for sturdiness and durability. The advantages of standardization, the message from across the ocean, are so apparent that no argument should be necessary. It begins with the manufacturer, includes the furnishing of spare parts, making of repairs, familiarity of all concerned with the type. The advantages in making repairs in the shops and in the fields is incalculable, and the reduction in tonnage required to carry over sets of spare parts for standardized trucks instead of for many different kinds is of the geatest importance.

General Rogers includes in his duties as chief of motor transport service procurement, maintenance, technical supervision and all repairs, except as applied to aviation trucks. Cars are districted throughout the field according to makes to insure a sort of standardization of parts for each district, avoiding the waste that would be created by haphazard distribution of the many different makes of trucks. The plan of maintenance includes a large supply depot in Central France far from the front, where a huge stock of parts is kept, and which is so situated as to have excellent railroad facilities and a large repair shop close by, which will be the main repair shop, with a capacity for 1200 trucks a month. Four types of repair shops will operate in all. There will be assembly at the base repair shops, a factory to do work requiring two to three weeks at a point nicknamed Central Park, semi-mobile repair shops operating 15 to 30 miles from the front lines on the jobs requiring several days of work, and the field repair shops working close to the front lines and making adjustable repairs.

Spare parts are distributed on two plans, salvage and exchange. Salvage includes the return of all metal and other materials to the big center depot where there will be a salvage department, and the exchange system includes the return wherever possible of damaged and ruined parts such as magnetos, before the new parts are issued. This scheme is pliable, working only to insure as much saving as possible and never interfering with the highest efficiency which demands the quickest action in emergencies.

Catalogs have been compiled, one showing the parts peculiar to each make of truck and the other combining the parts common to all trucks. There are approximately 1800 important common parts. The factory numbers of the special parts have been continued in use in the catalog, and thus it is simple to order a part that has been ruined, since all the driver has to do is to use the factory number on the injured part. All parts are ordered by drivers through the commanding officer of the division by requisition, but orders issued by General Pershing and General Rogers have eliminated the written requisition at the front, thus doing away with the time lost by the red tape and allowing for prompt work when it is needed.

The majority of the trucks are provided with permanent tops, the drivers being afforded every possible protection by the tops, special windshields and large goggles, because of the dust which has been found extremely thick all through the fighting territory. Two men, both expert drivers, are attached to each truck, and, according to Major Andrews, the drivers of motor trucks are the most popular men in the Army since they are the carriers of food, ammunition, bedding and clothing.

Troops are marched on foot only to an extent necessary to keep them fit and wherever possible are moved from point to point by motor truck. Cooking for troops and truck companies being moved overland is accomplished in kitchens on trucks.

Repairs by Hand

The difference between the repair work of the French army and the American army, stated Major Andrews, is the difference between hand work and machine work, for the French make the majority of their repairs by hand while the American forces are installing complete mechanical equipment to provide for machinery repair.

Manufacturers in this country will insure considerably greater efficiency for their products if they will turn out their trucks with as many nuts and bolts and other minor parts standardized as is possible. Tires are causing considerable trouble because of the great variation in sizes. Major Andrews was particularly emphatic in his request that the makers combine to standardize insofar as possible without necessarily affecting design. Simplicity and strength are the two real requisites. There are none of the many facilities for caring for trucks abroad that exist in this country. During the cold months, the radiators had to be drained daily because no anti-freeze solution was available and there were no heated garages in which to store the trucks at night. Gasoline is used conservatively for cleaning purposes because of its scarcity. All of which is mentioned by Major Andrews to illustrate the vast difference between treatment of the ma-

chines abroad and here, which is the important reason why makers should give much consideration to making trucks powerful and simple.

Major Andrews praised the present pooling system in use, stating that "pooling of our trucks, cars and motor supplies was the result of General Pershing and General Rogers, who, without any red tape, used their sound business judgment and worked out an organization that will enable us to handle the motor transport service of the expeditionary forces with 25 per cent fewer trucks than would be required if they were not pooled."

Motor trucks drive near the front line without headlights or sidelights, with drivers smoking cigarets to serve as guides and warning signals.

The American motor trucks have been found the best by all odds, not only in the American army but in all divisions of the Allied forces and have, according to Major Andrews, motorized the war.

Forty per cent of the passenger cars used in the army have closed tops, owing to the heavy dust and the frequent rains. Officers are not allowed to drive their own cars and operate under orders strictly specifying that officers must be ready for duty at all times and must not engage in such duties as will ruin their uniforms. Repair of the passenger cars is planned along the same lines as with the trucks. Speed along the main roads, through which the passenger cars take the middle course, leaving the outside to the trucks, is limited to 35 or 40 m.p.h., while on the roads near the front lines speed is prohibited above 20 m.p.h., except in cases of emergency.

Many trucks are needed abroad. In fact, stated Major Andrews, it is not possible to ship too many trucks as they can be used for so many purposes not now allowed because of the numbers.

Two-wheeled trailers are giving the best results, but all types of trailers are handicapped, according to Major Andrews, because of inadequate design. He stated that the most urgent needs was for a self-lubricating towing device and that there would be great demand for trailers so equipped.

Major Andrews will return to France within a few days, carrying back with him complete details and photographs of the new standardized trucks and of the great work accomplished here for motorizing our Army. He could not, of course, reveal any of the numbers of trucks in use or the number of men in the motor transport service, or, in fact, any of several details that would be of interest to us on this side, but he stated that much has been accomplished abroad and that he had every confidence in the present conduct of military activities in France of the American Expeditionary Forces.

STANDARD TRUCK COST SYSTEM

New York, Feb. 15—The adoption of a standard operating and cost system for motor trucks is to be taken up at the National Truck Owners' Conference here March 7-9. The conference agreed at previous meetings in Chicago and Detroit that a uniform system is necessary and a committee was appointed to develop and recommend such a system.

London Limits Gas Use

Cannot Be Used Unless Gasoline Is Legal for Motor Car Concerned

May Require Employment of One Kind Only

LONDON, Jan. 15—By a new order issued to-day, the use of gas for motor cars and motor trucks has been limited to those cases where it is legal to use gasoline as a motor fuel. This ruling represents another curtailment on the industry. It was thought that the use of coal gas would be permitted in that it allowed the conservation of gasoline, but the government apparently has decided to restrict the use of motor cars, no matter what fuel is used.

Feb. 9, a still further curtailment order is expected to go into force in that on that date a motorist must decide whether he will use coal gas or gasoline as a fuel. In other words, after Feb. 9, if your permit allows you to use gasoline, then you cannot use coal gas and vice versa.

This new ruling brings to the surface a possible development in motor car fuels which will continue after the termination of the war. There are some sections of the country in which the use of gasoline may cease entirely, particularly in sections where gas is plentiful, that is, those districts where bituminous coal is mined in great quantities. In such sections the voluminuous gas bag undoubtedly will disappear and the steel cylinder take its place. With the use of steel cylinders and compressors, coal gas will be carried more easily than gasoline, and in such sections, coal gas may supersede gasoline as a fuel. It is not likely that the gas bag will disappear during the period of the war, due to the difficulty of securing steel cylinders.

There is still another aspect to the fuel situation in England, following the war, namely, the possibility of using benzol. There will be gigantic supplies of benzol when the war is over, because the huge plants which have been put up to produce this satisfactory fuel are at present on war work only, but when the war is over benzol will be produced in great quantities, and it should sell at a lower price than gasoline.

SHOW BUILDING FOR AVIATORS

Minneapolis, Minn., Feb. 18—The Willys-Overland building in the Midway, which was the scene of the recent mammoth automotive show, has been turned into a branch Army aviation training school for the Dunwoody institute. It will be under the command of Commander William J. Terhune, formerly in charge of the Key West naval training station. At least 3000 men will be maintained there. The station grew too large for the Dunwoody and the University of Minnesota to accommodate. It is to be known as Signal Corps Aviation Mechanics' Training School. Instruction will be in ground aviation mechanics. The building is four stories and basement and if not large enough the building of the Illinois Steel Co. across University avenue may be commandeered, it is said. The men will be housed in the Willys-Overland warehouse, as well.

Why Not Let the Motor Truck Do It?

I CAN HELP YOU BY GIVING THAT FELLOW ON THE PLATFORM A LIFT!
THIS HOSS OF MINE HAS GOT ABOUT ALL HE CAN HANDLE
INTER-TOWN TRUCK FREIGHT SERVICE.
WAR
WORK
NATIONAL RAILROADS
LOCAL SHIPPING

Thaw Helps Driveaways

Opens Roads Westward for Overland Shipments of Cars and Trucks

Coal Situation Improves and Production Increases

DETROIT, Feb. 16—One of the most important developments of the week here and in the vicinity is the effect of the thaw. This has tended to open the roads westward, so that driveaways are starting again from nearly all the factories. Up to this week the only gateway out of Michigan was by way of Detroit and Toledo, and this was only kept open due to the continual passage of trains of trucks for the Government, followed by driveaways of commercial cars and passenger cars.

The coal situation also has been relieved by the thaw, and general production is on the increase. Probably the most noticeable fact as far as production is concerned is the necessity of Ford reducing his passenger car output by 50 per cent in order to take care of the big submarine destroyer program which he has undertaken. This means that production has dropped to 1500 cars a day instead of 3000, and since the demand has always been equal to or slightly in excess of the output, a tremendous market is open throughout the country for low-priced cars.

The Anderson Electric Car Co. is doing a considerable amount of Government work at the present time, particularly on truck No. 1 and No. 2 Government specifications. It is also making electrical industrial trucks for the Government. The passenger car output at the present time is about ten a day. It reports business very good, particularly throughout the East, and excellent in Washington, several from out of town having bought cars in this city. Anderson has sold 125 cars in Washington during the last year, driving the electrics over the road as far as Toledo.

Trade Congestion Continues

The Cadillac Motor Car Co. is having difficulty in shipping cars, due to the congestion. It requires thirty to forty freight cars a day but has been able to secure only ten or twelve a week. It is driving all eastern deliveries away, but it is impossible to drive west at present. Cadillac reports labor plentiful and is having no difficulty in getting all it needs. All the Government work done by Cadillac is carried on in a separate plant, not interfering with regular producion. It is scheduled to begin building Liberty engines in May or June.

The production of Maxwell tractors and the proposed large capacity Maxwell truck is being held up pending the arrangement of the factory to take care of Government work. A great amount of Government work is coming into the Maxwell-Chalmers plant, resulting in the rearrangement of production to a considerable extent. The tractor is not in production yet and will not be until the company is able to arrange its factory for Government work.

The inability of the Commerce Motor Truck Co. to deliver cars or to get freight cars is responsible for the curtailment of the output of this company. It is manufacturing six a day, whereas the output to fill orders would be fifteen a day.

The production of Dodge Brothers from the beginning of the concern to date is 225,000 cars. Production is not being curtailed at present, although work on war contracts has been started. They are unable to get enough freight cars to make deliveries, and driveaways have been cut down owing to the roads in the West being impassable. However, driveaways through Toledo and points East and South are going ahead without delay, and it is possible also to reach all points North.

The Republic Truck Co. has stepped up to eighty to eighty-five trucks a day, indicating the manufacture of war trucks is not interfering materially with the regular production.

The Federal Motor Truck has received a second order for several hundred 3-ton chassis for the Signal Corps. The first order, which was also for several hundred trucks, has been completed. The monthly production of the company is about 300, about 60 per cent of which is of the 2 and 3½-ton capacity and the other 40 per cent evenly divided between 1, 1½ and 5-ton trucks. The company is driving away about thirty-six trucks a week to Cleveland, Indianapolis and Toledo, the moderate weather helping very much in facilitating these driveaways.

AA TRUCKS REACH CAPITAL

Washington, D. C., Feb. 15—The first four sample AA ¾-ton Quartermaster trucks arrived in Washington late Wednesday night, making the journey from their respective assembling points in slightly less than four days. The average mileage of the trip was 18 m.p.h., and the gasoline consumption was 10 m.p.g. The trucks had no serious mechanical trouble enroute.

90,000 Trained Men

WASHINGTON, Feb. 15—The Government is in urgent need at present of upward of 90,000 trained men who must be familiar with motor vehicle work. The numbers required in a few of the important divisions are as follows:

Chauffeurs	53,124
Repairmen	30,900
Magneto repairmen	218
Tire repairmen	156
Truck drivers	465
Motorcycle riders	2,534

This represents but a small fraction of the great armies of trained workmen that is needed for the army. From the electrical trade approximately 22,443 men are needed.

There is a demand for approximately 17,000 radio operators. Nearly 5600 commercial engineers, electrical engineers and chemists are required. There is need for 29,400 workers, including metal workers, general machinists, tool makers, etc. Over 6000 railroad men are needed. Over 1800 steam engineers are needed. Approximately 14,400 wood workers and airplane manufacturers are required. These figures but represent a small idea of the educated working force needed back of the line.

Ford Cars Cut Half

War Work to Reduce Daily Output from 3000 to 1500

Largest Single Producer of Liberty Airplane Engines

DETROIT, Feb. 15—Reports that the Ford Motor Co. will abandon the manufacture of passenger cars are denied by factory officials. The Ford plant will be devoted largely to war work on airplane and submarine destroyer parts, with the result that passenger car production will be cut about 50 per cent. At the present time the normal output of the factory is about 3000 a day, and with a reduction of 50 per cent this will bring the output to 1500 a day. The Ford company is behind orders in practically all sections of the country on passenger cars, and the resulting cut in production from the war work naturally will cause a country-wide shortage of Fords as soon as the available supplies in branch plants have been used up. Ford dealers have been urging their patrons to place their orders early to take care of the demand which they realized would exceed the supply if the curtailment came, and the scarcity of Ford cars already has begun to be quite apparent.

Ford is to be the largest single producer of Liberty airplane engines. Although the company has been making cylinders only, under a new program complete engines will be made. Ford has so perfected the processes of making cylinders that a saving of from 40 to 50 per cent in their cost is possible. The Ford company is given 25 per cent of this saving by the contract with the Government, while the rest goes to the Government. It is understood Ford will commence the production of complete engines this month.

The Ford factory denies that prices will be increased March 1. This is in spite of the fact that dealers all over the country are advertising a positive raise after March 1.

PIERCE-ARROW FLEET ON WAY

Buffalo, N. Y., Feb. 15—A convoy of about sixty-five military trucks built by the Pierce-Arrow company for the Government will leave Buffalo this week for the Atlantic seacoast. The trucks will be driven by men of the Fourth Supply train from Camp Greene, N. C., with Captain Jack L. Meyer, quartermaster, in charge. There will be 164 men and six officers in the organization.

2100 AT SWEENEY SCHOOL

Kansas City, Mo., Feb. 15—The Sweeney Automobile School, one of the largest training schools for young men in the world, which has a regular attendance of 2100, has been requested by the Government to assist in training enlisted men in the internal combustion engine and a complete course of mechanics as necessary for the motor car, airplane, motor truck and motorcycle. The facilities of the Sweeney school are perhaps the most complete avail-

able for this work. At present the attendance of 2100 represents all states in the Union with the exception of two. The number of young farmers who are taking courses in mechanics is increasing rapidly. Eleven hundred and two joined the Sweeney school in January. Seven hundred and ninety-six joined in December and the enrollment in February to date is greater than that for the entire month a year ago. The school is running in two shifts at the present time. The present new building, which was occupied some months ago, is not large enough and an addition to add a third increase in capacity is being started.

METZ CONCENTRATES ON PLANTS

Waltham, Mass., Feb. 15—The Metz Co. is consolidating and merging all the business of its several plants under one management and one roof and for this reason decided to dispose of various parcels of land and lots of machinery which were scattered over a large area. A fire-proof, saw-tooth roofed building covering between 5½ and 6 acres of land has been erected, and Metz manufacturing will be merged in this one plant. The production of Metz cars will continue, though the company is using part of its facilities for airplane production for the Government. A previous new item, in the issue of Jan. 24, inferred that the company would turn all its facilities over to Government work.

The business of the Metz company has been distributed to four plants, the two plants farthest apart being 2½ miles from each other and the third and fourth plants between these two. With the business all under one roof the Metz company did not need all the machine tools and machinery necessary to operate at the separate plants, so arranged the sale of all the surplus.

REGAL MEETS TROUBLE

Detroit, Feb. 18—The Regal Motor Car Co. has been placed in receivership. A meeting of stockholders was held to-day and an effort will be made to resume production again in short time. After an inventory is taken the creditors will be called together to determine whether to liquidate or continue. It is expected by the Securities Trust Co., acting receiver, that the inventory will reveal enough parts on hands so that with a little additional expense the company can again resume operation. Assets of the company are $1,500,000, while the debts are said to be only $600,000. This is without the contingent liabilities. It may be decided to have the receiver buy the business and maintain it until the company can recapitalize and take over the plant themselves. The plant has been shut down for some time owing to inability to obtain coal. For a time the building was heated by a neighboring plant, but the latter found it difficult to procure fuel for itself and shut off the supply.

CLYDE CARS YEAR IS GOOD

Clyde, Ohio, Feb. 16—Sales of the Clyde Cars Co., builder of Clydesdale motor trucks, for the last year amounted to $1,331,045.91, which, after deduction of all costs and expenses and allowance for war and excess profits, leaves a balance of $41,259.64 as surplus. A dividend of 12 per cent has been declared, and plans for increasing production approved.

Second Used Car Show

Chicago Trade Association Completes Plans for Exhibit March 30-April 7

To Spend $5,000 in Advertising Event

CHICAGO, Feb. 15—The second annual Great Central Market Used Automobile show to be held at the Coliseum, March 30 to April 7 under the management of the Chicago Automobile Trade Association is to include trucks, accessories and kindred subjects along with used passenger cars. Production curtailment will force many prospective owners to buy used cars this year, and it is on such cars that most accessories find their home. Hence it is advisable and logical to include a display of motor car fitments at a show of this nature. These were among the ideas brought out at to-day's meeting of the association at the Hotel Metropole.

The used cars will be exhibited on the main floor of the Coliseum, and all space for this has been sold. The accessories will be in the annex, arranged with forty booths, each 10 by 12 ft. Eight of the latter were applied for at to-day's meeting. There will be no exhibits in the Coliseum or annex basements. The show committee consists of Erwin Greer, chairman, Henry Paulman and D. E. Whipple.

Last year's show was attended by 21,151 people, of which about 8000 paid admission. A much larger attendance is anticipated this year and $5,000 has been appropriated for advertising under the direction of Harry Newman of the Harry Newman-Stratton Co., Chicago. Erwin Greer stated that the show has the support of the N. A. C. C. General Manager Miles of the National shows has expressed his willingness to come to Chicago to help stage the show if the local management deems his help necessary.

South Biggest Buyer

LOUISVILLE, Ky., Feb. 16—The largest increase in motor registration in 1917 was in the South, a gain of 61 per cent over the preceding year. High prices for cotton, increased grain production, improved road conditions and a greater cattle and dairy output all have contributed to this demand for motor vehicles in the South.

In some localities orders have been obtained by the dealers in such quantities that the manufacturers have been unable to supply the demand.

Many of the states make no distinction between passenger cars and motor trucks in issuing licenses and figures include both types of motor vehicle. The count, however, is as nearly accurate as can be made. In a few cases estimates were made but by competent state and motor authorities.

The South holds first place in increased registrations by a safe margin. The other sections of the country named in order, and with their increases, are: Middle West, 42 per cent; West, 41 per cent; New England, 25 per cent. Although New York state leads the Nation in car registrations with 408,612, her percentage of increase in registration was only 30.

The motor vehicle registration by states for 1916 and 1917 follow:

STATE	1916	1917
Texas	125,000	194,740
Oklahoma	52,718	102,563
Georgia	46,025	70,563
Maryland	44,245	63,500
North Carolina	33,904	55,957
Virginia	35,426	55,661
Tennessee	30,000	48,500
Kentucky	31,500	47,413
Alabama	21,636	40,180
South Carolina	25,000	38,322
Mississippi	25,000	37,000
Florida	20,718	35,000
West Virginia	20,571	31,329
Louisiana	17,000	24,545

Oklahoma shows a gain of 94 per cent over 1916, leading not only the South but the Nation as well. It is predicted that Dixie will go way over the 1,000,000 mark in registrations in 1918.

FEDERAL ORDERS WORTH $4,000,000

Detroit, Feb. 15—Federal Motor Truck Co. business amounted to $6,005,000 for the fiscal year ending Dec. 31, as compared with $4,261,000 for 1916. A fund of $225,000 has been set aside for excess profits tax and a reserve charged for depreciation of $110,391. The total surplus of the company is now $698,993, having been increased $456,826. The total production of trucks this year was 2918 as against 2442 last year. Unfilled orders on the books will total approximately $4,000,000, consisting of 300 foreign orders, 1100 domestic orders and 700 special Government trucks.

McCLAREN HEADS AJAX RUBBER

New York, Feb. 18—H. L. McClaren has been elected president of the Ajax Rubber Co. to succeed W. G. Grieb, who has retired from active connection with the company after eight years of continuous service. For several years Mr. McClaren has been president of the Racine Rubber Co., Racine, Wis., which position he retains, as the Racine and Ajax companies are affiliated. In addition Fred E. Dayton, for many years general sales manager of the Ajax Rubber Co., has been elected secretary, and Stuart Webster, treasurer of the Racine Rubber Co., has been elected vice-president of Ajax. The other officers and the directors were re-elected.

CHICAGO TOOL BREAKS RECORD

Chicago, Feb. 15—The Chicago Pneumatic Tool Co. ended 1917 with the largest earnings in its record. Net profits for the year were $2,006,371 as compared to $1,577,980 in 1916, which is equal to 16½ per cent on the capital stock in 1917 instead of the 12½ per cent in 1916. The business has increased almost fourfold since before the war. The percentage on capital is after deduction of 4 per cent on net income and war excess profit taxes.

COSTS OF INTERCITY TRUCKING

Lansing, Mich., Feb. 16—One of the Duplex trucks made a trip from the company's factory here to Pittsburgh, Pa., in 60 hr. actual running time at a total cost of $56.11. The total mileage was 391, and 59 gal. of gasoline were used, which amount to 6⅝ m.p.g. In addition 5 qt. of

oil and 1 pt of water were consumed. The truck left Lansing at 3 o'clock on a Monday afternoon and arrived in Pittsburgh the following Friday morning at 2 o'clock. The total cost of $56.11 includes driver's wages and expenses, gasoline, oil, depreciation, tires, insurance and maintenance.

The railroad freight rate between Lansing and Pittsburgh on 7000 lb., the truck's capacity, is $41.30, or 14.81 less than the cost of transporting 3½ tons of merchandise by truck. However, the truck hauled its load direct from the manufacturer's factory in Lansing to the business house of the purchaser in Pittsburgh, saving cartage charge at both ends. Also, the freight was delivered in Pittsburgh several days in advance of the railroad freight traffic schedule.

HIGHWAY ASSOCIATION ELECTS

Washington, Feb. 16—The Highway Industries Association held a meeting here to-day and elected the following officers and directors: President, N. S. Williams, sales manager of the Garford Motor Truck Co.; first vice-president, A. R. Hirst, Wisconsin state highway engineer; second vice-president, E. J. Mehren, McGraw-Hill Publishing Co.; third vice-president, S. L. Henry, Allied Construction & Machinery Corp. The directors include Windsor T. White, White Co., representing the motor truck Industry through the N. A. C. C.; William E. Metzger. Columbia Motor Co., representing the motor car industry through the N. A. C. C., and W. O. Rutherford, sales manager B. F. Goodrich Co., representing the Motor and Accessory Manufacturers' Association.

PLAN "RETURN LOADS" SYSTEM

Washington, Feb. 18—Special telegram —The Highway Transport Committee is working out a plan under the "return loads" system to relieve congestion east of the Mississippi river. The plan is to establish first return loads through Boston to Washington, then New York to Buffalo and next Philadelphia to Chicago, taking in Cleveland, Detroit, Indianapolis and Cincinnati.

At first the aim will be only to hit the large cities, but later it is planned to include the smaller towns also. The committee is working through the chambers of commerce of the various cities on the routes, pointing out to them the need of getting together the man with goods to ship and the man with a truck empty or partly filled. Letters are going forward to-day which aim to have the system in operation soon. George P. Wilson, secretary of transportation for the allied trades body, Philadelphia, will co-operate with the committee.

MARYLAND PROPOSES NEW LAW

Baltimore, Md., Feb. 16—Sweeping changes are incorporated in the new motor vehicle law introduced into the state legislature. The bill was drafted by the state law department after preparation by E. A. Baughman and O. I. Yellott, counsel for the A. A. A. and the Auto Club of Maryland, and, as a whole, enlarges the definition of motor vehicle to include tractors and traction engines.

The fee for pneumatic vehicles is increased from $5 to $10, and that for vehicles with solid tires from $8 to $12 on a rated carrying capacity of not more than a ton and from $6 to $9 for each additional ton. Motorcycle fees are increased from $3 to $5 with $3 for side cars. Bicycles with motor attachments are assessed $3. Dealers would pay $25 for the first two sets of tags, an increase of $5. Additional sets are $12 each instead of $10. Motorcycle dealer fees increase from $8 to $20 for the first four sets of tags and $5 instead of $2 for additional tags. A trailer fee is $5 for each ton carrying capacity. Tractors and traction engines have flat charges of $25.

Persons learning to operate must obtain a permit at $1 and all future applicants for licenses must be examined. Penalties for non-registration are increased from a minimum of $25 to $100 and the maximum from $100 to $1,000 with imprisonment of not less than thirty days or more than a year. The speed limit of solid-tired vehicles weighing 2 tons or less is reduced to 25 miles maximum; 2 tons and not more than 6 tons, 15 miles; and more than 6 tons, 12 miles. Speed in thickly populated sections for all motor vehicles is 15 instead of 12 m.p.h. Penalties for exceeding 60 m.p.h. are from $100 to $1,000 or imprisonment of not less than thirty days or more than a year. Owner and operator alike are subject to penalties. Magistrates may release offenders on their personal recognizance in proper cases. Other provisions are included.

Vernon Castle

FORT WORTH, Tex., Feb. 15.—After braving death over the German lines for nearly two years with but one minor wound, hero of some 150 flights, Capt. Vernon Castle of the Royal Flying Corps lost his life here to-day while serving as instructor of American student aviators—and lost it to save the lives of two cadets.

Captain Castle, who attained much renown before the war as an actor and dancer, was killed by a fall of less than 100 ft. To avoid collision with another aviator, which spelled certain death to the cadet aviator with him and the pilot of the other plane as well as himself, he drove his machine so directly upward that the engine stalled and his plane fell, killing him instantly in the wreckage. The other machine landed safely.

Officers and cadets of the Royal Flying squadrons and of the American aviation squadrons will attend Captain Castle's funeral tomorrow after which he will be taken to New York by an escort of honor from the Royal Flying Corps for burial. Captain Castle was one of the most popular men on the aviation fields. His work was especially on the Flanders front. He came to Fort Worth last October, and his flying stunts attracted the same unusual attention his dancing did.

MOTOR MEN ARE PROMOTED

Washington, Feb. 15—Capt. Chas. S. Dahlquist, formerly engineer for the Timken-Detroit Axle Co., and now in charge of the axle inspection for the motor transport section of the Quartermaster Corps, has been promoted to be a major. Lieutenant Rudolph Finkenstadt, formerly assistant to Christian Girl at the Standard Parts Co., Cleveland, Ohio, and now assisting Mr. Girl in the motor transport section, has been promoted to a captaincy.

WOULD REDUCE AVIATORS' PAY

Washington, Feb. 15—Following a report from General Pershing that aviation is not an extra hazardous service, Secretary of War Baker has submitted to the Senate Military Committee a bill to repeal all pay allowances in the aviation service, averaging about 50 per cent. The measure submitted by Secretary Baker also will create a new grade of aviators to be filled by specially qualified civilians at $150 a month.

HARROUN STEPS UP PLANT

Wayne, Mich., Feb. 16—The Harroun Motors Corp. is now turning out between twenty-five and thirty cars a day. During the month of December 500 cars were produced, and a program of 750 cars was planned for January. There are 350 men employed at present, and by March 1 the company expects to have a working force of 1000 men.

CALIFORNIA CHEVROLET GROWS

Oakland, Cal., Feb. 15—The Chevrolet Co. of California estimates it will turn out approximately 1400 cars during the present month. At the beginning of the month there was a total of 1500 cars on order. The company will spend about $1,000,000 in additions and improvements to the present plant.

Come On! Help Show the Kaiser

Launch a Blow by Helping Launch a Ship—
U. S. A. Needs 250,000 Men

THE United States needs men, 250,000 of them, to build a bridge of ships to the boys in France. This means the United States needs you, if you are a mechanic, master of a familiar trade, and will help.

It means American brawn and American skill is needed at the shipyards. It is an opportunity open to all, for even the poorest man can volunteer for ship-building at the wages offered. If you enlist for this you will be doing as much to win the war as the men dependent on you in the trenches. Ships are the pivot on which the destiny of the United States turns, and Uncle Sam is looking for 250,000 U. S. A. shipyard volunteers to build them. Are you one of them?

Our shipbuilding program calls for 6,000,000 tons a year. More than 1000 ships. With these the wheels of American industry will keep moving and American labor will be kept busy in the factories.

The Shipping Board has the money, the materials and the yards—it needs men. There must be a huge reserve of skilled labor to draw on as fast as the plants can be completed in the yards and housing can be provided.

Loyal American mechanics and masters of familiar trades are asked to enroll as shipyard volunteers, for work in the shipyards when needed. This does not mean you are to give up a job and rush off to some shipyard. The shipyard may not be able to accommodate you just now. Your enrollment simply shows that you stand ready, when called, to do a particular job for a particular wage in a particular place. The trades are listed and an enlistment blank is provided on this page.

If you have never worked on ships, that does not bar you. There are not enough men in America who actually have worked on ships to make more than a tenth of the ships we need if we are to do any fighting worth while. Germany knows this, and that is why she thinks America cannot build ships. Uncle Sam wants you to help show Germany America can build ships.

Almost all trades are represented in the list of those whose workers are wanted for building ships. Familiar trades—your trade—are the ones that build ships. Ships are not things of mystery—they are merely big buildings afloat, the product of every-

Man of the hour

day skill and industry. The American mechanic can build them.

So come on, you men, 250,000 of you, and prove that this country can build ships. The United States is asking that you answer the rattle of German machine guns with the rattle of the riveter. It is asking you, for the present, to prove that you are the marrow of Americanism by going on record with an expression of your willingness to help build ships where you are needed. Fill out and mail it.

Edward N. Hurley, Chairman U. S. Shipping Board, Washington, D. C.

I wish you would send me at once further information, telling me how I can enroll as a member of the U. S. Shipyard Volunteers of the Public Service Reserve for employment in shipyards and so help win the war.

My trade is.....

My name is .....

Street address.....

Town .....

State .....

These workers Are Needed

Acetylene and electrical welders
Asbestos workers
Blacksmiths
Drop-forge men
Flange turners
Furnace men
Boiler makers
Riveters
Reamers
Carpenters
Dock builders
Chippers and calkers
Electrical workers
Electricians
Wiremen
Crane operators
Foundry workers
Laborers, all kinds
Loftsmen
Template makers
Machinists and machine hands
Helpers
Painters
Plumbers and pipe fitters
Sheet-metal workers
Coppersmiths
Shipfitters
Structural iron workers
Erectors
Bolters up
Other trades
Cementers

Two-thirds of the occupations used in shipbuilding are common to other industries, such as boiler making, car building, bridge building, carpentering, machine shop work, etc. If you possess the right sort of training, now is the time to rally around the flag. A badge of honor issued by the Shipping Board will show that you have volunteered to help throw across the seas a bridge of ships by which the armies of the United States can pass to do their duty on the fields of France.

To wear this button is a sign of distinction. It stamps the owner as the man of the hour in whose hands rest the happiness and security of every man, woman and child in this country.

HIGHWAY COMMISSION IS UPHELD

Austin, Tex., Feb. 15—The validity of the act creating the state highway commission and imposing a registration fee upon all motor vehicles has just been upheld by the state appellate court here. D. S. Atkins brought injunction proceedings to restrain the highway department from collecting the registration fee which he alleged was a tax, excessive and unreasonable. He urged that the act levied tribute solely and absolutely upon the ownership of vehicles and for the declared purpose of raising revenue and therefore was a tax and not a registration or license fee for the privilege of the operation of motor vehicles upon the public highways. The district court refused a writ of injunction.

The law may not be skillfully drawn, held the appellate court, but considering all its provisions it seems fairly clear that the fees imposed are for the license or privilege of operating motor vehicles and motor cycles upon the public highways of the State. It was alleged that the fees collected produced a sum twelve times the amount required for registration, regulation, policing and administering the law and that such a tribute is a tax and not a registration fee. The evidence tends to show that the cost of administering of the entire law is $75,000 per annum and the estimated receipts from registration are $1,394,000, says the opinion.

M. A. D. PLANS OTHER SHOWS

Milwaukee, Wis., Feb. 15—The results of the motor truck section of the 1918 show were so gratifying that the Milwaukee Automobile Dealers, Inc., are planning to conduct another exclusive truck exposition early in October, at which time the winter use of commercial cars to relieve transportation difficulties such as arose during the present winter will be emphasized. The association intends to conduct a big passenger and commercial car and tractor show at the Wisconsin state fair in September, as it has during the last three years. A salesroom-circuit spring show also is planned for the middle of April.

New Trade Regulation

President's Proclamation Puts Motor Export and Import Under License System

Rubber Restrictions May Limit Tire Production

WASHINGTON, Feb. 16—President Wilson by a sweeping import proclamation and another far-reaching export proclamation has placed all foreign trade of commercial trucks, passenger cars, tractors, airplanes, boats, tires, gasoline and lubricating oils and many other raw materials and finished products under license.

The direct purpose is to increase the shipping tonnage for the military establishment by reducing to a minimum the exportation and importation of raw materials and finished products not immediately essential to conduct of the war. The President specifically states that the promulgation of his proclamations does not mean an embargo on exports or a prohibition of imports but rather regulation of both, regarding which there will be no hasty decisions. Licensing of the exports and imports will be handled by the War Trade Board.

Import Regulation

The regulation of import of crude rubber will have a great effect on the manufacture of tires, as rumor already has it in Washington that crude rubber importation for tire manufacture for passenger cas will be greatly reduced when licensed.

The stipulation of "all contrivances for, or means of, transportation on land or in the water or air," etc., is taken to mean motor trucks, motor cars, some forms of tractors, airplanes, tires, accessories, spare parts and all necessary repair tools.

At this time it is not possible to learn to what extent the exportation of automotive parts or the importaion of crude rubber for tire manufacture will be regulated. Decisions limiting both the export and import will not be given to the public until they have been made the result of deliberation and thorough investigation. It may be some time, therefore, before announcement is made regulating exports and imports in degree, although it may be possible that the War Trade Board already has made its decisions regarding limitation on exports and imports but maintains secrecy about them at present.

The present situation is serious, but it is not likely that consequences will be drastic; nor does it appear likely that great difficulty will be experienced in obtaining licenses necessary for the exportation of such motor cars and trucks as must be shipped out of the United States.

This, in brief, is the way the matter is summed up by Peter Steenstrup, vice-president of the General Motors Export Co. Steenstrup points out that the number of ships required to carry all the cars and trucks sent out of the United States during 1917 is but a small percentage of the total number afloat and that inasmuch as the United States must have products from foreign countries with which to carry on the war, and that ships must be sent to those countries to get the products, those ships might as well be used in part to carry motor cars and trucks abroad for they are as essential abroad in accelerating the production of food and other war products as they are in the United States.

Allowing a maximum of 6 tons shipping space per car based on measurement, all the passenger cars shipped out of the United States last year could have been put into sixty-three ships averaging 5000 tons capacity each. In other words, 53,043 passenger cars were shipped.

At the present time exporters are shipping cars and trucks in sailing vessels which are entirely too slow for other purposes. Vehicles are also to be shipped lashed to the deck of cargo vessels.

THE proclamation on imports includes the following articles in its list: Rubber, cotton, glass, all kinds of fuel, all machinery, tools, dies, plates and apparatus and materials necessary for their manufacture, all metals, minerals, mineral oils, ores and derivatives and the products, derivatives and substitutes of rubber.

THE proclamation on exports places under license and regulated exports the following: All contrivances for, or means of transportation on land or in the water or air, machines used in their manufacture or repair, component parts thereof, materials or ingredients used in their manufacture and all instruments, articles and animals necessary or convenient for their use, rubber and its products, derivatives and substitutes, cotton, glass, all metals, minerals, mineral oils, ores and all derivatives in manufacture thereof, all machinery, tools, dies, plates and apparatus and materials necessary or convenient for their manufacture.

Manufacturers at Detroit are doubtful regarding the effects of the licensing order on exports. Ford probably will cut off all commercial exports and only ship abroad cars intended for Government use. This, however, would have been done regardless of President Wilson's order. Ford already has stopped freight shipments to congested seaboard points, such as New York and Philadelphia.

Some of the concerns state that foreign business has been dead anyway. Spain also has stopped buying since the embargo has been placed on shipments of gasoline and oil to that country. Manufacturers look for a modification of that part of the order in which the weight of copper, aluminum and other metals in parts must be listed, as this would be practically prohibitive on certain parts. A great many other manufacturers state that the restrictions imposed on shipping will not be nearly so drastic as those which have already been imposed on freight shipments to the Atlantic Coast, therefore the limiting factor will be the internal transportation situation rather than the external.

West Driveaway Now

Cars from Factories Come Overland to Chicago and Are Sent On to West

Road Crews Clear the Roads of Snow Banks

CHICAGO, Feb. 18—Driveaways from Michigan factories to Chicago and points west have begun to-day with the partial clearing of the roads by efforts of road crews and the recent short thaw. The local Dodge distributor received word from the factory that the road is open between Chicago and Detroit, and a crew of ten men is leaving the factory to-day, and five more leave to-morrow. There are twelve cars on the way to Chicago from the Reo factory at Lansing and they are reported to have reached Michigan City. One hundred cars for the Buick branch at Chicago will leave Flint to-morrow night so that the driveaways are on in earnest, although no cars have come through as yet and there is a possibility that conditions in some parts will be so bad that the crews may be held up a few days.

Reo Well Equipped

The train of Reos is particularly well equipped to buck the snow, being preceded by a car equipped with a rotary snow plow, which is expected to make roads through the drifts which still exist. The local Reo distributor expects to receive eight or ten cars a day, throughout the season. To determine the road conditions for the Buick fleet, the entire road is to be covered before to-morrow night by cars from Flint, Benton Harbor, Michigan City and Chicago, each traversing a certain section of the road. These cars will have a crew of five men equipped with shovels, etc., to clear away the drifts at the worst spots and have the roads ready for the fleet of 100 which starts from the factory to-morrow. The Chicago Buick distributors have arranged for a schedule of from 100 to 150 cars per day over the roads, and it may be that before the season is over, the high water mark of 185 Buicks per day, which was reached last summer, will be duplicated.

The possibilities of using the lake boats for shipment to Chicago from Michigan factories is being investigated seriously, and if possible, cars will be driven from several factories to ports on the east side of the lake and shipped by boat to Chicago. Scarcity of bottoms, however, may prevent this being done to any great extent. Studebaker is arranging to ship by boat from Grand Haven, and Maxwells may be shipped by boat if bottoms can be obtained. Harry Newman, the local Maxwell distributor, is endeavoring to charter his own ships which, if they can be obtained, will be used to carry raw material on the eastern trip and Maxwells on return, thus saving railroad capacity both ways. At the present time, Maxwells have been arriving in the Chicago district by railroad, in sufficient quantities, and it is expected that this month will prove one of the biggest in the year.

The circus cars and other flat cars of the Oakland company, some of which belong to the local dealer and some of which are leased, obviate the necessity of driving Oaklands overland.

Utilizing Chicago as a shipping platform for Michigan car manufacturing centers is an innovation which has been put into force by the Reo company. The factory maintains a crew of eight men at the Chicago branch, which loads the cars received by driveaway on freight cars for shipment for the west. Reo also has been using twenty-five horse cars and express cars, which it has leased, for railroad shipment.

MICHIGAN TO TRAIN TRACTOR MEN

Lansing, Mich., Feb. 15—A school which will train men for the 1918 crop drive by teaching them the operation of farm tractors will be conducted here by the Michigan Agricultural College during the two weeks from March 4 to 16, with Prof. H. H. Musselman of the M. A. C. in charge. This training camp is for men who expect to use these tractors or would like to fit themselves for such service on Michigan farms in 1918. Candidates for this course will be required to report at the college on March 4 and will enroll in the department of farm mechanics for the special tractor just as if they were regular students. A battery of a dozen engines, both steam and gas, will be used in the work.

2000 AT TRACTOR SCHOOL

Columbus, Ohio, Feb. 15—The first tractor school, held at the Ohio state fairgrounds this week, was a success in every particular. Nearly 2000 farmers, farm women and others interested in pushing tractors for farm work registered. The school was the result of action of the state officials and particularly the Ohio Council of Defense. More than twenty tractors of different makes were placed at the disposal of the students by manufacturers and agencies. Practical tractor salesmen and mechanics, in addition to professors from the Ohio State University, acted as instructors.

Engine trouble, repairs to tractors, adjustment and carbureters, etc., composed the subjects for instruction. Experts from the factories cut out the ignition system or put the carbureter out of commission for the students to remedy.

Among the registrants were a dozen women, many of whom were from the farm and desired to become acquainted with the mechanics of tractors. In quite a few instances both the husband and wife were registered.

HARRIS NOW IN ARMY

Cleveland, Ohio, Feb. 16—James A. Harris, Jr., has resigned as advertising manager of the White Co. to accept a commission as captain in the Quartermaster Corps and is succeeded by Millard N. Newton, who has been connected with the company's advertising department for the last five years. Captain Harris already has assumed his military duties, having been assigned to Mechanical Repair Shop Unit No. 305.

Racing Revival Pending?

Two Organizations Announce Plans and Drivers for 1918 Season

Situation Hazy Since A. A. A. Is Out During War

CHICAGO, Feb. 19—Motor racing in America for the next year or so may not be wholly off the boards if the plans of three different sets of promoters materialize as they expect. When, in response to what may have been Government suggestion, the American Automobile Association announced last December it would sanction no more races during the war, a decided damper was put on racing as a whole, because the A. A. A. for years has been the official arbiter of organized racing. The A. A. A. and those in sympathy with the organization felt that the need of transportation facilities, fuel and skilled drivers and mechanics was such that the continuation of racing would be unpatriotic. It was believed that the services of the skilled drivers and mechanics could be better given to the Government either in aviation or in motor transport of our troops.

Some of our racing stars have gone into the aviation service. Rickenbacher, for one, is driving a plane in France. Others are in the transport service. But the Government does not seem to have taken full advantage of the skilled men thus released and, in fact, has shown a definite reluctance in some instances to utilize racing drivers or their crews. With most of the cars and many of the drivers available, it is not unnatural that steps should be taken for utilizing them in racing this year unless the Government disapproves.

Stepping aside of the A. A. A. from racing has made it possible for some of the organizations which heretofore have been looked upon as outlaws to have a chance at the A. A. A. stables. Of the organizations which have staged races of more or less local importance with or without A. A. A. sanction in previous years, two at least have announced plans for a rather ambitious racing season and local promoters also are announcing plans more or less ambitious in scope.

The whole situation is rather hazy at the present moment, but if the announcements of the promoters can be believed and if the Government does not put its foot down on racing by prohibiting fuel and transportation, it seems we will have races at Sheepshead Bay, the speedway at New York, Providence, Uniontown and Philadelphia, as well as the series of state fair events promoted by the International Motor Contest Association.

The most ambitious program is that announced by W. H. Wellman, who states that four of the foreign drivers, Rene Thomas, Alfred Guyot, Arthur Duray and Jean Chassagne, who have not raced in America for several seasons, will come to America for a series of speedway engagements. Wellman says the four foreign stars have signed contracts to appear this season. Nothing has been said about what cars they will drive. Wellman also announces that both Dario Resta and Ralph de Palma have been signed for the season on a $50,000 guarantee.

Wellman, who with Pickens, campaigned Barney Oldfield and Ralph de Palma last year in their match racing, claims to have guaranteed the foreigners $60,000 for their summer's work. According to the Wellman-Pickens combination, Thomas, Guyot and Duray will bring Peugeots for racing, while Chassagne will have the English Sunbeam. If these are licensed for import racing status may be assured. The Wellman-Pickens program comprises an opening event Memorial Day on the New York speedway and another July 4 at Providence.

C. W. Johnson, president of the Uniontown speedway and director of construction of the Philadelphia motor speedway, which is being rushed to completion for an opening early in October, says that he has several drivers interested. Plans for the opening race at the Uniontown speedway May 16 or 30 are under way.

In response to a question ten days ago as to the possibilities of his partaking in the Uniontown and Philadelphia events, de Palma said, "In reference to driving in 1918, I will, if the Government decides that racing is essential for the entertainment of the people. I have not signed for any racing in 1918 and will not do so unless the Government approves racing. If the Government approves racing, I am ready to race."

London buses taking Tommies from the fighting front for a rest

Farm Tractor Maintenance

Cleaning and Adjustments of Parts Which Need Care at Periodical Intervals for Best Service

By H. C. Skinner
Motor Age Editorial Staff

RECOGNITION by the farmer of the tractor as an efficient and economical substitute for animal power has brought a new type of mechanical machine to the farm. Heretofore the farmer has had only the more or less crude implement to contend with, the care of which consisted of a liberal use of axle grease. In most instances the motor car has preceded the tractor to the farm and practically has educated the farmer in the care of automotive machines. However, the care of the motor car, motor truck and tractor are somewhat similar in nature, and if one has had experience with either of the others, the care of the tractor will be simplified to a great extent.

The conditions under which the tractor has to work are different from those of the other automotive machines, as the tractor when working is under a constant load that is very near its maximum power output, and probably the majority of days that it is in the field, the soil is dry and the atmosphere is saturated with dust. This fine dust is very injurious to machinery, and some provisions must be made in the design to protect both the engine and the other working parts from the effects of it. To prevent the dust entering the engine through the carbureter, the air is strained or washed to remove any free particles that may be in it. This is also true of the breather pipes which lead to the engine crankcase, as it is important that the engine-lubricating oil be kept clean to prevent damage to the bearings.

Due to the deteriorating effects of the dust all the parts such as the clutch, gearset, final drive, wheel bearings, etc., are usualy inclosed as is the practice in motor car engineering. Tractors constructed on this basis are easier cared for and have a longer life. On account of the heavy work that the tractor has to do the design of the prime mover and the principle units which make up the machine are perforce larger and stronger than those of the motor car on truck.

Dangers to Tractors

Overloading and overspeeding are liable to injure any machine, and great care should be taken when a tractor is new not to overload it or to increase the speed by tampering with the governor adjustment. Either one of these may cause more harm to a tractor when it is new than two years' service in the field. Therefore, it is essential that a new tractor be handled with care, as it is a trait of human nature to see if one can stall a new machine.

As a general rule tractors burn kerosene due to its being a cheaper fuel, but nevertheless it has its drawbacks due to the possibility of the unburned portions of the fuel passing the pistons of the engine and diluting the crankcase oil. This is more noticeable in engines burning kerosene or distillate, due to the higher ignition temperature required, than in engines burning gasoline, and this condition is at its maximum when the engine is cold. Therefore, it is important not to race or speed up the engine when it is warming up in the morning, and also on account of the fact that the cylinder walls may have been drained almost dry by standing over night and a sufficient supply of lubricating oil may not be present to insure proper lubrication. It is a very simple matter to score a cylinder wall or piston at this time when the oil film between the two is practically disintegrated. This condition is accentuated further by the fact that lubricating oil is heavier when the oil is cold and therefore not so liable to fulfill its function as when the engine properly is warmed up.

During the days that the tractor is working in the field or elsewhere it should be oiled thoroughly each morning in accordance with the manufacturers' instructions. It always should be borne in mind that the life of a tractor, or any other machine for that matter, is dependent upon the care that it receives. In connection with the care of tractors their life could be increased considerably providing they were given regular systematic inspections to determine their mechanical condition. A general scheme for these inspections is arranged in the following outline.

1—Engine Adjustments—Perhaps the most important item under this heading would be to test the engine compression, which can be done by turning the engine over by hand and comparing the compression in the cylinders with each other. If each cylinder compares favorably within reasonable limits with the others then it can be passed as being in good operating condition. If one or more cylinders are found to be weak, then the cause of this weakness must be located. This can be done by checking first the pushrod adjustment for proper clearance. These clearances for the customary truck and tractor engine should be about 0.006 in. for the intake valve and 0.008 in. for the exhaust valve. However, if the pushrod adjustments prove to be standard and the compression is still weak, then it probably will be necessary to grind the valves, first the exhaust, because it is subject to the most heat when in operation and is, therefore, likely to be in the worst condition. Providing the grinding of the exhaust valve does not cure the trouble then the intake valve will have to be ground. A slight variation in the compression of engines also is to be expected due to the fit of the pistons and rings in each cylinder not being exactly the same as that of the other cylinders. At this time it is also an excellent plan to check up the clearance of the pushrods on the remaining cylinders to be sure they are all standard.

2—Clean Carbureter, Fuel and Air Strainers—Drain the carbureter and remove the cover to the float chamber. Then clean the carbureter bowl and float so that any dirt and water that may have accumulated is removed. Now remove and clean the strainer at the entrance to the float chamber and at the same time test the flow of fuel from the tank to make sure that the fuel supply line is not blocked by any obstructions. If the fuel flow is not equivalent to the size of the line, then remove it and clean it. If the fuel is not being supplied with sufficient rapidity when operating in the field, this can be noticed by frequent back-firing through the carbureter, although back-firing cannot be attributed always to a lack of fuel. Practically all tractors are equipped with an air strainer or washer to remove all dust from the intake air before it enters the engine. These are supplied with a form of trap in the air line so that the accumulations from the washed air can be removed. This should be cleaned thoroughly, and the same should be done with the strainer for the engine crankcase breather pipes.

Cleaning Magneto

3—Clean and Adjust Magneto—Remove the distributor board and clean the contact surface, using a small piece of No. 00 sandpaper if necessary to cut the dirt collected. The collector ring brush should be removed also and the ring itself cleaned by turning the engine over and holding a clean cloth against the ring on the armature. Remove the cover to the magneto breaker box and clean the points. If the points are pitted, they can be dressed by a fine Swiss file. In doing this one should be careful that the points are lined up properly so that the faces of the points meet squarely. It is not a good policy to file the points too much as it wastes metal. It is better to remove the points and square their surfaces with a light-weight hammer providing it appears that filing is going to waste considerable metal. Now examine all wiring in connection with the ignition system and make sure that the connections are tight. Also see that the wires leading to the spark plugs are not worn through their insulation at any place so as to cause a short-circuit. This is most liable to occur when the wiring is inclosed in metal conduits. The proper spark plug gap adjustment for practically all makes of ignition apparatus is $\frac{1}{32}$ in. and the erratic missing of an engine can be traced sometimes to the fact that the spark plug gaps are set too close.

4—Engine Lubricating Oil—As stated before the heavy-fuel engines are most liable to have trouble with the dilution of the crankcase oil with gasoline and kerosene. Lubricating oil that is diluted in excess of 25 per cent with a foreign liquid loses its qualities as a lubricating oil and must be changed. Trucks have been known to dilute the crankcase oil in 500 miles of running to such an extent that it was no longer fit to be used. This is about equivalent to a week's work in the field with a

tractor. The crankcase oil in a new tractor should be changed after about the first six days of service and once each twelve days of service thereafter.

5—Cooling System—At the time of each inspection the radiator should be flushed thoroughly to prevent the possibility of any sediment from the water blocking the circulating system. All radiator hoses and connections in the water system should be examined for leaks, collapsed hoses, etc. If the water pump packing nuts are up to their limit of adjustment then the packing nuts should be repacked with a graphited cord packing. Also repack the grease cups on the water pump and tighten the fan belt if needed.

6—Governor—The governor shaft should be oiled in the place provided for this purpose. Under no circumstances is the governor adjustment to be changed, as any increase in speed is liable to prove detrimental to the tractor.

Care of Clutch

7—Clutch—Two types of clutches are in general use, the cone and multiple disk. In inspecting the clutch, the cover to the clutch housing should be removed. Then inspect the clutch release or throw out bearing to be certain that same is lubricated properly. These bearings usually are oiled through an external flexible tube. The cone clutch leather should be kept soft and pliable to prevent the clutch from grabbing. This can be done by treating the leather with a small amount of neatsfoot oil. The multiple disk is constructed in two general types, the dry and wet type. The latter type runs in an oil bath and if this type slips, the clutch case must be drained and flushed out with kerosene. The bath should be mixed in accordance with the manufacturers' instructions. Most of these use a bath of half kerosene and half lubricating oil. Slipping of the cone clutch can be stopped by placing a small amount of Fuller's Earth on the face of the leather. Do not permit a cone clutch to slip for any length of time as this will burn the face of the leather and in all probabilities necessitate replacement of the leather.

8—Gearset—The oil level in the gearset should be maintained on a level with the oil plug level with which most cases are supplied. If there is no level plug, this may be assumed to be on about a level with the main shaft. Inspect the gearset for the general condition of the bearings, gears, end play in the shafts, etc.

9—Universal Joints—Remove inspection plug and see that joints are supplied with sufficient lubricant. Also test the flange bolts and be certain that they are tight and that the joints do not have an excess of lost motion.

10—Rear Axle—Remove inspection plug and bring oil to level in the rear axle housing. Test the driving gear adjustment by determining the play between the driving gears by hand.

11—Wheels—Raise the wheels from the ground and test them for play in the bearings. Caution is to be observed in adjusting roller bearings as they must have sufficient play in them to permit of a floating action. If roller bearings are adjusted too tight they will heat and the cups and cones will be cut by the tight action of the rollers. Repack the wheels with lubricant if it is necessary.

12—Steering Gear and Connections—Remove any lost motion that may exist in the steering connections. Examine steering knuckle pins and oil and free up all steering parts. Repack the steering gear case if necessary.

The advantage of these inspections is that they reduce trouble to a minimum by locating any defect which may develop before it becomes serious enough to cause any real damage. It is somewhat difficult to recommend the time at which inspections should be made, as there are times in the year when the tractor is working almost every day and then other times when the machine is idle. During the busy season the tractor should be inspected at least once every two weeks and once a month during the remainder of the time.

How Motors Transport Troops

Took French and British to Italy

THE transfer in the minimum of time of big French and British forces from the French to the Italian front, when the latter was threatened by the great Germano-Austrian thrust, was one of the triumphs of the motor vehicle. Under war conditions, which obviously exclude Switzerland, there are two railroad routes between France and Italy. The more northern one passes the frontier near Modane, by the Mont Cenis pass, 6500 ft. above sea level, and the other follows the shores of the Mediterranean. To get the armies into Italy in time to save the situation, these two lines had to be turned over exclusively to one-way military traffic, most of the trains returning empty not to lose time in loading. This railroad traffic included all kinds of war material, not neglecting motor cars.

The railroad was not alone in taking relief to the Italian forces. There are two main passes over the Alps, one at Mont Cenis, following practically the same route as the railroad, and another cutting across very near the coast line; between these two there are a few minor passes, all of them less than 6000 ft. but often presenting difficulties by reason of the roads. All these available roads were made use of by motor convoys, which at times passed in a continuous stream. As there has not been since the war any great amount of road traffic between Italy and France, these various routes naturally formed one-way roads, which was a fortunate condition, for even on perfectly engineered European roads the passage of incessant convoys in a mountainous district is not an easy operation. The difficult nature of the operation will be understood when it is mentioned that on some of these Alpine routes there is a continuous climb for twelve miles and an unbroken descent for 14½ miles. Many of these mountain roads are merely a ledge cut out of the face of the cliff; many of the village streets were only just wide enough for two touring cars abreast and did not give sufficient room for two trucks to pass. There were sharp hairpins which if not taken with the correct lock on the first attempt would necessitate backing and the possible holding up of the entire convoy.

More than a hundred years ago Napoleon passed over these same Alpine roads with horse and mule convoys, and the task still is pointed out as a marvel of organization. The traffic of the French and British armies which went into Italy by road in October and November, 1917, is greater than that required by Napoleon and was much more difficult to organize, for the time element was most important; yet the whole was handled in a marvelous manner and has been passed over by the general public as almost commonplace.

Many Road Signs

To reduce the possibility of accidents, road signs were erected on a liberal scale. In this district direction was the least important indication. As the men did not know the roads, warning notices gave indications of all the obstacles ahead and told where the men had to change into bottom gear to get the advantage of the engine as a brake on the dangerous descents. On the long climbs it was necessary also to warn the men so that they would space out and have their sprags down in case the truck should begin to run backward.

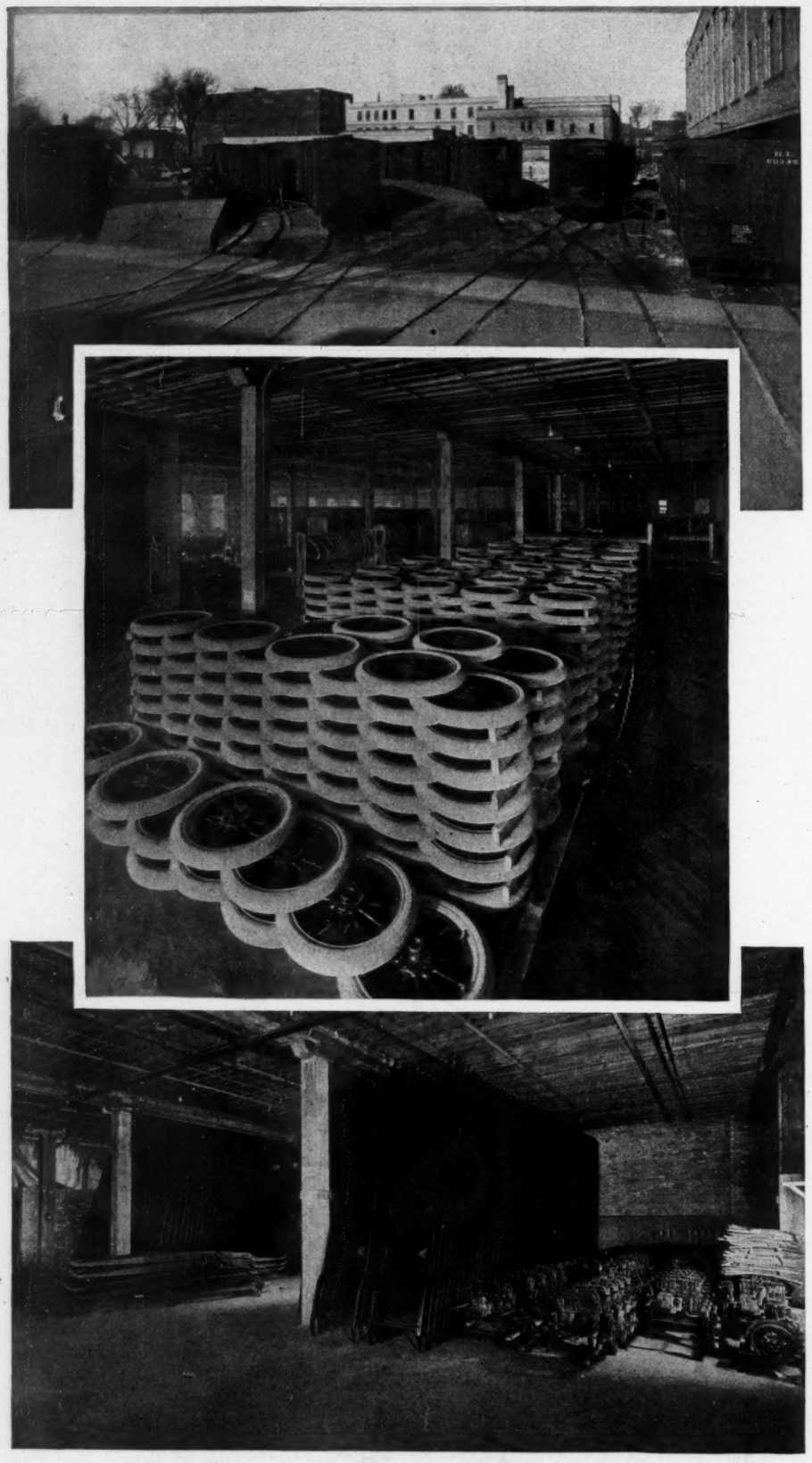
Trucks were grouped in convoys of twenty, each group being in charge of an officer, and no group allowed to overtake another. Every truck was provided with its own two-wheel trailer, one of these being a workshop and another a kitchen, for each convoy. The truck with the workshop trailer was provided with ropes, pick, shovel, planks and long levers to give assistance to any vehicle which met with a road accident. Aboard the kitchen trailer meals were prepared for the entire personnel of the convoy—between eighty and ninety men—while the column was in motion. The supplies of food carried made the men independent of the country through which they were passing, but stages were so planned that several columns would reach the same town at night, when the men would be housed in the local barracks, in some public building or, if necessary, billetted with the inhabitants.

Every truck carried its own gasoline and oil for the entire journey and, in addition, a certain provision of gasoline to allow them to operate on reaching the Italian front. The distance which had to be provided for varied from a few hundred miles to over a thousand, some of the troops starting from near the frontier, while others had to move from Northern France into the heart of Italy. This huge movement of motors was responsible in a very large measure for the shortage of gasoline experienced by the public in many districts of France. The army had to take the whole of the reserve stocks found in their district and for a time left civilians without a drop of gasoline.

Space for Goods

Generally the freight space aboard the motor was made use of for goods rather than troops. Over such a long distance it was more economical to send infantry by train and let the motor columns handle the material required by the artillery and the engineers. Much of the motor-hauled artillery was sent through advantageously by road, while the horse-drawn material was put on the railroad.

Making a Railroad Car Efficient



All the tracks, top, except one are used by Pence. Twenty-five freight cars are accommodated. At the center is the assembled wheel stock, where 2500 are most of the time. Below are frames which come in carloads of 420 and 500

A GOOD example of making one railroad car do what two and a half were needed to do is found in the Pence Automobile Co., Buick distributor for the four states of Minnesota, North Dakota, South Dakota and Montana, a territory of approximately 400,000 square miles, or an area practically six times as large as the Boston distributors have in all the six New England states put together.

Beginning as far back as April, 1917, Pence discovered that he could not get enough motor cars for his 450 dealers if he relied on shipments by railroad cars and so decided to begin the assembly of cars in a three-story warehouse he had in Minneapolis.

2800 Since July

This assembly program was carried along slowly until July when the 1918 lines started coming through. Since then Pence has assembled 2800 Buicks and in the same time has received only 450 by railroad shipments from Flint, Mich.

The railroad economy effected by the assembling is indicating by the fact that it is possible to ship the parts for ten Buicks in one 36-ft., small-door railroad car, whereas it was possible to only ship four Buicks in a 40-ft. special railroad car. It is a case of ten cars instead of four in each railroad car, and using a small railroad car, too small for carrying complete motor cars, in the bargain.

The Pence assembly work is carried on in a three-story brick building, 222 by 150 ft. Here twenty-five Buicks per day are assembled by from eighty to 100 workmen and when work is at the peak it will be possible to assemble forty cars per day. This warehouse has been converted into a realy assembly factory, with special channel metal tracks along the assembly floor to guide the small hand trucks on which the chassis rests while it is progressing along the assembly floor.

The chassis rests on these trucks when it leaves the assembly floor to enter the steam washroom, where all grit and dirt are removed before passing into the spray paint room, where the painting is done identically as it would be in the factory. From this paint floor the chassis moves into a long three-track drying oven, which has capacity for thirty-six painted chassis at one time. It is a long wood oven, in which atmospheric temperatures are used but provision is being made to use higher temperatures to speed up drying.

Assembly Conveniences

On the chassis assembly floor are many other assembly conveniences, such as overhead cranes to pick up the frame and hold it while axles are being fitted and to turn the frame over and mount it on the assembly truck. Another crane swings the engine unit into place at one point on the assembly track. Convenient storage spaces are provided for all parts that enter into the chassis as it progresses.

At present only two models are assembled, the small six and the four-cylinder model, and these only in touring car mod-

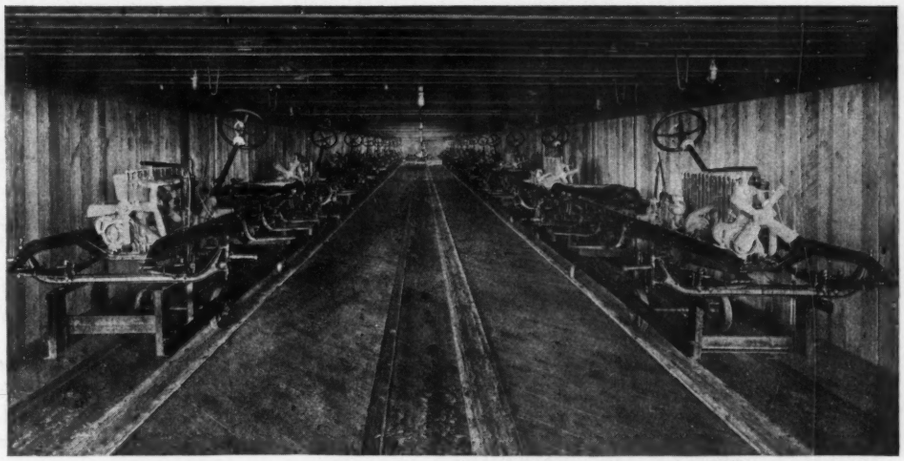
els. Runabouts are not assembled, as it would complicate the stock of parts to be carried and generally render the system more complex. The bodies for the six are received in unfinished state and the 450 Pence dealers can get color options which were impossible from the Flint factory. This aids very materially in the selling of cars by dealers and now as gaudy color combinations are seen in Western Montana as you see on Broadway or Michigan avenue.

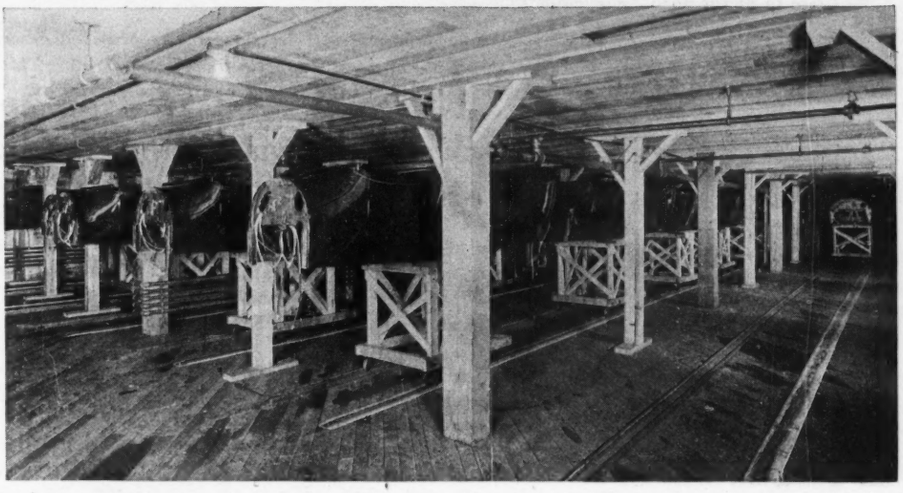
Pence aims to carry on hand constantly parts for two weeks' assembly, or approximately 300 cars. The shipments from the factory are made in units of eighty six-cylinder cars and 120 four-cylinder jobs. In shipping this material carloads of engines are made up, forty to a carload. Twenty-four bodies are loaded into one car. Other carloads are made up of frames and others of miscellaneous parts. Everything comes from Flint with the possible exception of frames, which are shipped direct from the frame factory in Milwaukee. Wheels are shipped with tires mounted and inflated. Tops are shipped in carload lots.

100 Workers

Of the 100 workmen employed not one was brought from the Buick factory in Flint. There was no difficulty in obtaining workmen in the Twin Cities. They are paid on piece work, and each man has a certain part to do in the assembly chain. If one workman gets behind he holds the line of assembly up, but the operations are so timed that, excepting with a green workman, there is no delay. The piecework plan encourages co-operation among the men, and if one workman gets behind due to breaking of a small part the others assist him, rather than delay the entire assembly line.

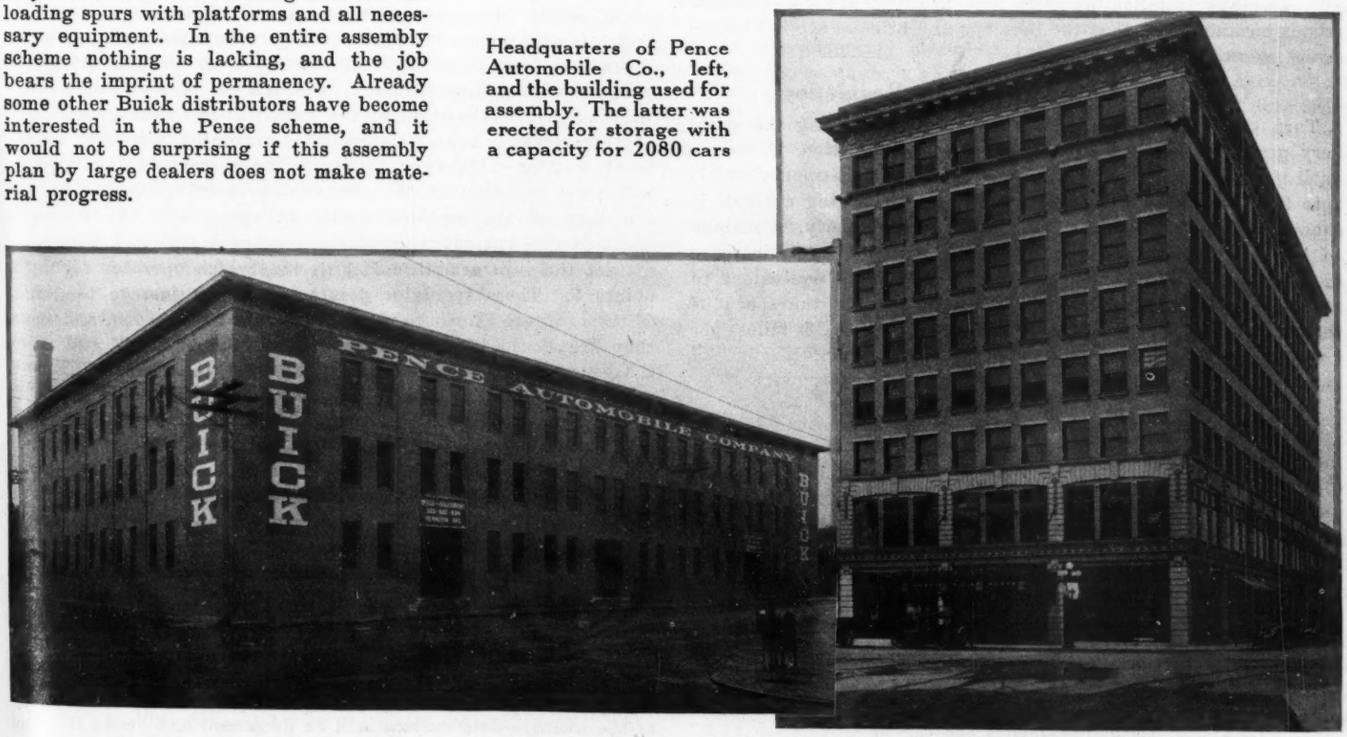
Factory loading and unloading facilities are provided in four railroad spur extensions which are alongside of the factory. There are two loading and two unloading spurs with platforms and all necessary equipment. In the entire assembly scheme nothing is lacking, and the job bears the imprint of permanency. Already some other Buick distributors have become interested in the Pence scheme, and it would not be surprising if this assembly plan by large dealers does not make material progress.





At the top is the chassis drying room, where thirty-six chassis can be dried at one time in three rows of twelve cars each. The room is 180 ft. long The room at the bottom is for drying the bodies. There is a capacity of 100 bodies, which are received without finishing coats. They are shipped by second class

Headquarters of Pence Automobile Co., left, and the building used for assembly. The latter was erected for storage with a capacity for 2080 cars



Electrical Equipment of the Motor Car

By David Penn Moreton & Darwin S. Hatch.

Editor's Note—Herewith is presented the eighty-third installment of a weekly series of articles begun in MOTOR AGE, *issue of June 29, 1916, designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the U. P. C. Book Co., Inc., New York, in a size to fit the pocket conveniently.*

A thorough explanation of the fundamentals of electric circuits preceded descriptions of the general types of starting, lighting and ignition apparatus, signalling devices, magnetic transmissions, etc. This is being followed by the installation, care and repair of individual systems, beginning with the special equipment for Fords.

Part LXXXIII—Gray & Davis System for Ford Cars Concluded

THE proper adjustment of the cut-out is given in one of the following sections.

If the ammeter does not indicate any charging current at all when the engine is speeded up, determine whether the generator or the cut-out is at fault. Examine wires between generator and regulator and cut-out, also between generator and battery. Examine brushes and cam insulator. Run engine at speed of approximately 12 miles per hour, lights turned off, and while engine is running connect a wire from generator terminal A in Fig. 453, which is the lower terminal on the side of the machine, to the terminal B on the cut-out which is the terminal to which the green wire is connected. If the ammeter then indicates charge and does not indicate charge when points A and B are not connected together, the cut-out is at fault. If the ammeter shows neither charge nor discharge when the points A and B are connected together the generator is at fault. Carefully inspect the machine to see that the field wires are not injured, that all wires are installed properly and firmly connected to their proper terminals and that the bearings and brushes are not excessively worn.

Generator with Third-Brush Regulation

Turn the lights off and run the engine, increasing the speed very gradually. If the ammeter shows no indication of current until the engine has reached a speed equivalent to approximately 7 to 9 miles per hour and then indicates a charging current, it shows that the cut-out is closing the circuit properly. Continue to increase the engine speed, and the current should increase in value to 12 to 15 amperes at an engine speed equivalent to approximately 13 to 18 miles per hour. Now as the speed of the engine further is increased, above perhaps 18 miles per hour, the charging current should decrease in value to approximately 10 amperes for the high speeds.

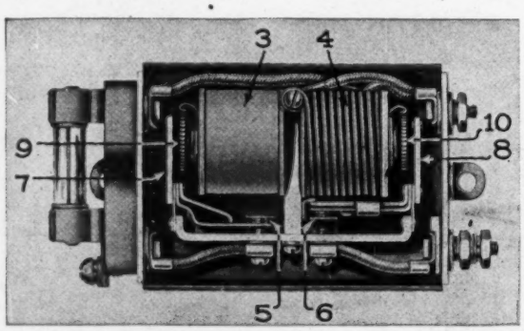


Fig. 454—Interior of Gray & Davis combined electromagnetic regulator and cut-out

Decrease the engine speed gradually and if the current decreases in value and when reaching a value of 0 to 2 amperes discharge the pointer returns to zero while the engine is slowed down still further and is brought to rest, it indicates that the cut-out is opening the circuit at the proper time. If the ammeter should indicate several amperes and discharge before returning to zero or should continue to show discharge and not return to zero when engine is stopped, it indicates that the cut-out is sluggish or that the cut-out points are stuck together.

If the ammeter does not indicate charge at all when the engine is speeded up, determine whether the generator or cut-out is at fault as explained in the latter part of the previous section.

Combined Regulator and Cut-out

The interior of the combined electromagnetic regulator and cut-out is shown in Fig. 454. The principle of this device is quite simple and its operation may be explained as follows: Coil 3 is a fine wire or shunt winding. The circuit of this winding may be traced in Fig. 453, starting with terminal A, to the terminal of the fuse marked A, through the fuse and small-wire winding just to the right of the fuse, thence to the ground connection marked X and through the generator armature to the point A from which you started. The current in the winding will vary in value as the electrical pressure generated in the armature of the machine varies in value, and the magnetic effect of this current when it has reached a sufficient value will attract the iron armature 7, Fig. 454, which operates regulator points 5. These regulator points are shown just to the right of the terminal F, on the regulator-cut-out in Fig. 453, and when they are closed, the resistance between the points F and A on the generator is shunted through the following circuit. From A on the generator to A on the regulator cut-out through the fuse, through the heavy winding shown on the upper right-hand corner of the regulator-cut-out, thence to the regulator points, to the terminal F on the regulator-cut-out and then to the terminal F on the generator. The regulator joints are adjusted by turning knurled screw 9, Fig. 452, which regulates the gap between parts 7 and 9. Decreasing the gap decreases the output and increasing the gap increases the output. The larger the gap, the smaller the fractional part of the total time that the regulator points short-circuit the resistance connected between the points A and F on the generator, as shown in Fig. 450. This resistance is in series with the field winding of the generator and as the length of time it is in circuit is increased, the value of the average field current will be decreased and hence the field

strength will be lowered, which will cause a decrease in the electrical pressure generated in the armature winding, and hence a decrease in the current delivered by the machine. Increasing the fractional part of the total time that the resistance is short-circuited will increase the value of the average field current, and, as a result, the output will be increased.

Electromagnet 4 in Fig. 454 has two windings, a coarse winding and a fine winding. The fine winding is connected in parallel with the winding on the regulator coil as shown in Fig. 453, and the coarse winding is connected in series with the generator and battery when the cut-out contacts are closed. The magnetic pull on the armature 8, Fig. 454, when of sufficient value, draws up the armature and closes the cut-out points 6. The cut-out points are adjusted by turning knurled screws 10. Turning this screw to increase the gap causes the cut-out points to close earlier and stay in longer. Increasing the gap causes the cut-out points to close later and open earlier.

Adjusting Cut-out and Regulator

Before attempting to adjust either the cut-out or the regulator, make sure that the remainder of the electrical system is in proper operating condition, all connections are tight, brushes adjusted properly, commutator clean, etc. A reliable ammeter always should be connected in series with the red and green wire leading from the fuse on the cowl to the starting switch. It is not advisable to rely upon the readings of the ammeter on the dash if an ammeter has been installed.

To adjust cut-out, gradually speed up the engine and watch the ammeter to determine the value of the closing current. The closing current is the reading on the ammeter at the instant the cut-out points there. If the ammeter does not indicate between 1 and 3 amperes when the cut-out points first close, turn adjusting nut 10, Fig. 454, to bring the reading between 1 and 3 amperes with the lamps turned off. Gradually slow down the engine and observe the reading of the ammeter when the cut-out points open. The ammeter should indicate between ½ and 2 amperes discharge when the points open. By repeating this operation a few times, an adjustment can be found which will give satisfactory results. If the cut-out points are not clean, a piece of paper should be drawn between them, at the same time pressing them together with a slight pressure. If they are roughened, a piece of very fine sandpaper may be used in smoothing them off. Be sure to clean thoroughly the points after using the sandpaper and be extremely careful not to bend the springs supporting them as this will cause serious trouble, as you will then be unable to make a satisfactory adjustment.

The operation of the regulator should be such that the ammeter will indicate approximately 9 to 10 amperes at all speeds higher than the speed corresponding to 12 to 13 miles per hour. If the ammeter indicates a current very much less than this amount, adjustment of the regulator may be necessary, especially if the battery has a tendency to run down gradually. If the ammeter shows more than 14 to 15 amperes when the engine is speeded up, the regulator points should be adjusted.

The regulator points should be cleaned thoroughly as in the case of the cut-out points. The engine should be operated at a speed equivalent to approximately 18 to 20 miles per hour, and the knurled screw 9 in Fig. 454 turned so that the current is about 9 amperes. The adjustment may have to be repeated several times before altogether satisfactory results are obtained. It is always best to have the battery fully charged, if possible, when making the above adjustments of the cut-out and regulator. After both the cut-out and regulator have been adjusted, each should be given a final test to make sure that the adjustment of the last one has not interfered with the adjustment made in the first one. If any change in adjustment is found to have taken place, the necessary changes should, of course, be made.

On Third-Brush Type of Generator

The cut-out used will be the third-brush type of generator as shown in Fig. 455, and the complete cut-out located in the housing of the generator is shown in Fig. 456. There are two

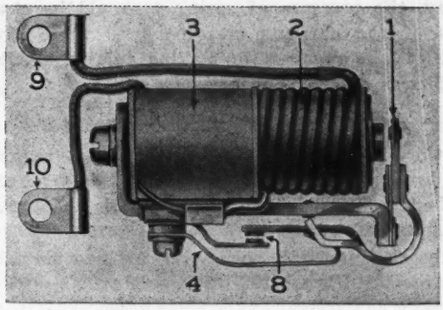


Fig. 455—Gray & Davis cut-out used with third-brush type of generator

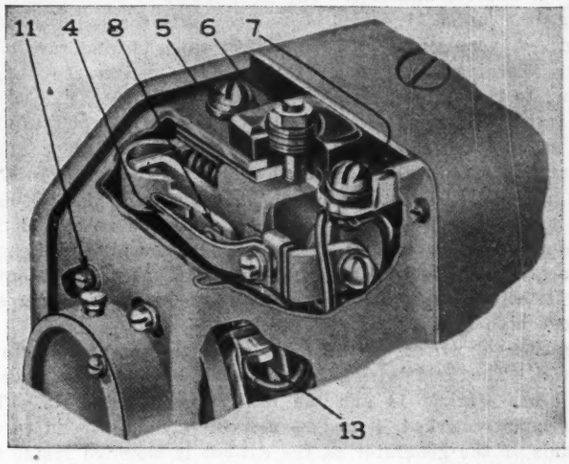


Fig. 456—Part of housing on Gray & Davis third-brush generator cut away, showing method of mounting cutout

windings on the iron core of the cut-out as shown at 2 and 3 in Fig. 455. The electrical connections of these two windings are shown diagrammatically in Fig. 450. The heavy winding 2 is connected in series with the generator and battery, while the fine-wire winding is connected across the terminals of the generator in such a manner that the current taken by the fine-wire winding passes through the coarse-wire winding. As the speed of the generator increases, there is an increase in the value of the generated electrical pressure in its armature winding, and, hence, there is an increase in the value of the current in the fine-wire winding, since the winding is connected permanently in circuit. When the magnetic pull exerted by the current in the fine-wire winding has reached such a value that it will pull over the armature 1, Fig. 455, the cut-out contacts 8 will be closed and the circuit between the generator and battery will be completed. If the electrical pressure of the generator is greater than the electrical pressure of the battery, the battery will start to charge and the current will pass through the coarse-wire winding 2 in such a direction that the magnetic action of this current assists the magnetic action of the current in the fine-wire winding and the armature 1 is held firmly in position and the contact points are closed. As soon as the electrical pressure of the generator drops below the pressure of the battery, due to a decrease in the speed of the engine, the battery starts to discharge and the current from the battery flows through coil 2 in the opposite direction to what it did when the battery was charging and hence its magnetic action opposes the magnetic action of the current in coil 3. This relation of the two currents reduces the magnetic pull on the armature 1 and permits the spring 4 to open the cut-out contacts 8 and thus prevent a further discharge of the battery through the generator.

The cut-out points should close when the engine is operating at a speed equivalent to approximately 7 to 10 miles per hour, and the ammeter should indicate from 0 to 3 amperes charging current when the points first close. When the engine slows down, the cut-out points should open when the discharge current is from 0 to 2 amperes. When adjustment of cut-out points

is necessary, the pressure of spring 4 should be changed until the values of the currents correspond to those given above. Some skill will be required in making this adjustment. Clean cut-out points as described in previous section.

Adjusting Output of Generator

In the third-brush generator the output is regulated by a regulating brush called the third brush. This type of regulator was described in detail in one of the earlier chapters, when the different types of regulation were treated. The Fig. 457 shows the brush-supporting yoke with the two main brushes 13 and 14 and the third brush 12. It is very seldom, if ever, necessary to make an adjustment of the third-brush generator, but when adjustment is necessary it should not be undertaken without the use of a reliable ammeter. The adjustment is accomplished by turning the pinion 11, which is provided with a slot for a screwdriver. A very slight turn will affect the charging rate materially. Turning the pinion to the left increases the output; turning to the right decreases the output. When the generator first is tested, it is run at various speeds from 500 to 3000 r. p. m., and the third brush is so adjusted that the charging rate at any speed will not exceed a definite amount, usually 12 to 15 amperes. The operation of the third-brush type of regulator is such that the output reaches a maximum value and then tapers off for higher speeds. The maximum charging rate should be reached when the engine is running at a speed equivalent to 15 or 18 miles per hour and then decrease to about 10 amperes for very high speeds.

The internal wiring of the third-brush generator is shown in Fig. 458. The field wiring is connected between the positive main brush marked 14 and the third brush marked 12. The two terminals marked + and — respectively correspond to the terminals of the generator as the cut-out is mounted inside the generator housing.

Starting Difficulties

If the starting motor cranks the engine when the starting pedal is pressed to the full limit of its travel and the engine fails to start to run under its own power after, at most, 10 seconds, release the starting pedal and determine the reason for the failure. Any one or a combination of the following troubles may be the cause:

Ignition switch not turned on.
No gasoline in the tanks.
Spark plugs dirty or defective.
Ignition wires not firmly connected.
Cylinders need priming.
Cylinders flooded from too much priming.
Carbureter not properly adjusted.
Dust in carbureter or gasoline pipes.
Poor grade gasoline or water in gasoline.

If the starting motor fails to crank the engine when the starting switch is operated, it may be due to a weak or discharged battery. If the lamps dim excessively when starting switch is operated, it shows that the battery practically is discharged, or perhaps the battery cables are not connected firmly to the battery terminals and transmission case, or there is a poor contact in the starting switch, or the engine may be very stiff. If the lamps remain bright, that is, do not dim at all when the starting switch is operated, it shows that the starting circuit is open. Examine all parts of the circuit for an open circuit or poor contact. It may be necessary slightly to bend the blades in the starting switch in order that a good connection may be made. Examine the starting motor brushes. If excessively worn, they will not make firm contact with the commutator. If the commutator is dirty or rough it should be cleaned thoroughly and wiped with a rag on which there is a little vaseline.

If pressing the starting pedal to its full limit fails to rotate starting motor, release the starting pedal and determine the cause which may be due to any one or a combination of the following:

Battery very weak or completely discharged.

High resistance in motor circuit due to loose connection or poor contact in switch or at brushes.

Motor may be short-circuited by cable being in contact with some metal part of the car.

The starting pinion may be wedged so that motor armature is not free to operate.

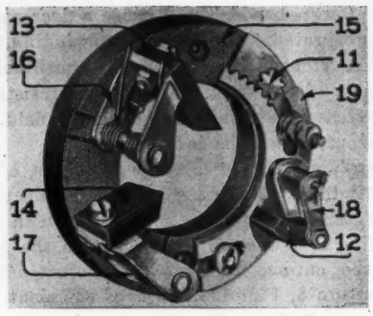


Fig. 457—Brush supporting yoke and brushes for Gray & Davis third-brush generator

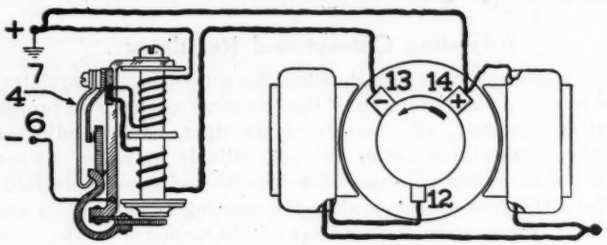


Fig. 458—Wiring diagram of internal connections of Gray & Davis third-brush generator

TEXAS TO GROW CASTOR BEAN

Austin, Tex., Feb. 15—Advices received by the State Department of Agriculture are to the effect that the appeal of the United States for an increase in the production of castor beans for castor oil as a lubricant for the new Liberty engine will meet with a wonderful response on the part of the farmers of Texas. It is expected that more than 100,000 acres will be devoted to the crop this year. It has been demonstrated in a small way that the yield of castor beans in Texas runs from 40 to 60 bu. an acre, with perhaps about 50 bu. as an average, as compared with an average yield of about 30 bu. in the more northern parts of the country. If 100,000 acres were planted this season it would mean a possible yield of about 5,000,000 bu. In view of the fact that the Government has promised the prospective growers that it will pay $3.50 a bushel for the beans, delivered at the nearest railroad station, the incentive for embarking in this new crop production is great.

NO SNOW ON PACIFIC RUN

Seattle, Wash., Feb. 15—The Pacific Northwest Highway Run was conducted recently from Vancouver, B. C., to Portland, Ore., to tabulate actual road conditions and to show effectively what could be done on Pacific Northwest roads in midwinter. Some of the results were: No snow was seen at any time along the route. Only 40 min. of rain was encountered in 15 hr. running time. Of a total of 361.1 miles, all except 5 could be traveled in high gear. An average speed of 26.1 m.p.h. But one tire change was necessary, that due to a puncture. Gasoline consumption averaged 15.5 m.p.g.

From start to finish the run was both a record breaker and a success in every particular. In all 175 motoring parties were counted in the course of the run between the Canadian boundary and the city of Seattle.

A. A. Ross, McLaughlin Carriage Co., Ltd., Vancouver, left the Canadian city on the northern end of the run, while Dudley Fortin, Eldridge Buick Co., went north to meet the Ross party at the Canadian boundary line. Each car arrived a few minutes earlier than expected and both report a most successful trip. The Portland-Seattle leg was the most difficult.

The Accessory Corner

Grace Carbon Remover

THE Grace carbon remover is a preparation to be mixed with the lubricating oil in an internal combustion engine to remove, and prevent the accumulation of carbon. Frequent cleaning of spark plugs, grinding valves and new piston rings are prevented, it is claimed, while power and mileage are increased and oil and fuel saved. The preparation contains no acids, alkalis or chemicals and has no action on metal, it is said. Enough to neutralize 5 gal. of lubricating oil costs $1.—Grace & Co., 3205 West Washington street, Los Angeles, Cal.

New HB Charging Outfit

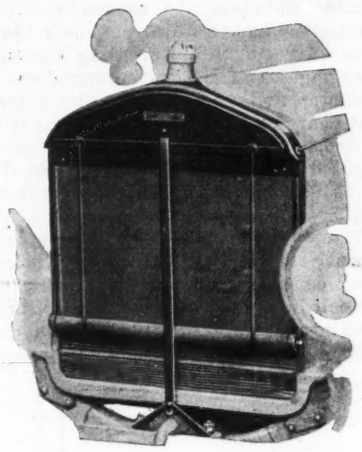
The new HB charging outfit has a 2-kw. thirty-two battery capacity and is for the garage or service station. All stages of charge are handled by the four charging lines, caring for eight batteries in each line. Batteries requiring different charging rates can be handled according to their individual needs, due to the ample output of the machine. Different-voltage batteries also can be charged in the same line, due to the automatic voltage control of the generator. Hobart Brothers Co., Troy, Ohio.

Engine-Testing Valve

The Goodrich engine-testing valve is fitted with a bell-mouth opening which allows for ample expension of the gases, relieves the engine of all back pressure and intensifies the sound of the explosion. When the valve is open none of the exhaust goes through the muffler. The spring which operates the shutter is not affected by the heat, thereby holding its full tension at all times. There are no adjustments, and cleaning is effected by removing one cotter pin. A specially prepared paint prevents corrosion and rust. That motorists using the valve may not run afoul of the prohibition of muffler cut-outs in some of the states the user is cautioned to exercise great care in the use of the valve merely as a test of the engine's running and not as a noise-maker. The device is attached to the exhaust pipe and needs no attention after installation. Prices, from $3 to $4.25, according to size. —Goodrich-Lenhart Mfg., Widener building, Philadelphia, Pa.

Harac Air Regulator

The Harac air regulator is an adjustable air-tight shield fitted to the front of the radiator and raised by a pull handle attached to a reinforced control cord and lowered by gravity. When the desired opening is obtained, as shown by a red signal, the control cord is engaged in the catch close to the driver's seat. In this way the quantity of cooling air passing through is controlled according to the weather and running conditions. It is for application on 1917 and 1918 Fords, and installation is made in 5 min., it is said. Metal parts are finished in enamel and nickle. Price. $5.—Harac Sales Co., Philadelphia, Pa.



Harac air regulator attached to car

Portable electric drill and tool post grinder

Russ Welding Apparatus

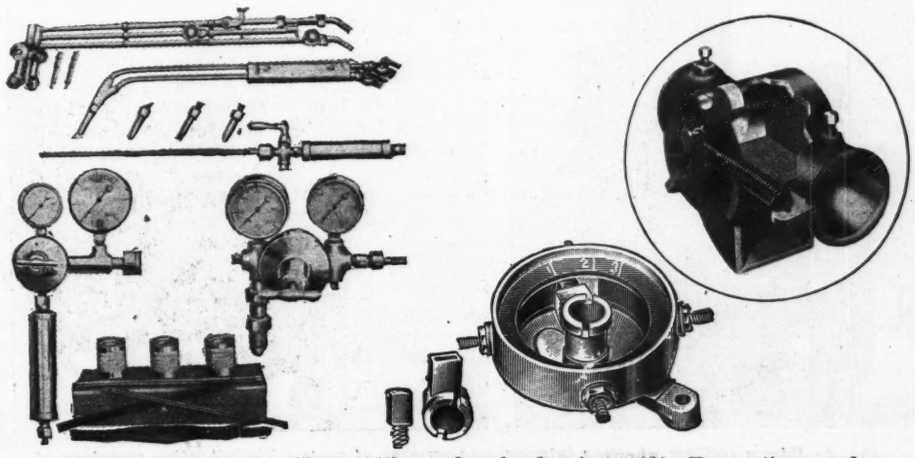
The Russ welding, cutting and carbon-burning outfit consists of No. 17 oxygen head, No. 6 acetylene head, lighting cutting torch with three nozzles; Russ welding torch with four nozzles; Russ carbon-burning nozzle with small expension chamber; two 10-ft. lengths of hose connections; and a carton of welding supplies. The supplies consist of three aluminum, ten steel wire, six cast iron and three Tobin bronze welding flux, a pair of welding goggles and instruction book. Price, $100.—F. W. Stewart, 1402-1406 Michigan avenue, Chicago.

Hyway Oilless Timer

The Hyway timer is designed according to the system of brush contact. The brush is made of specially machined hardened brass, slightly curved and beveled to fit the ring. It can be renewed easily when worn and is the only part necessary to renew. Oiling is unnecessary. The shell is of stamped steel black enameled. The fiber is bone dry and hardened to give least wear. Price, $1.25.—Hyway Mfg. Co., Chicago.

Portable Electric Tools

The Gilfillan electric drill is equipped with gears to give two speeds, changed by a knob on the bottom of the gearcase. The gears are of chrome nickel steel and run in grease. Ball bearings are used throughout. The speed range is 400 r.p.m. on low and 700 r.p.m. on high speed. Westinghouse motors are furnished. The same concern also makes a tool post grinder adapted for use on lathes. An angle plate can be clamped around the tool post. The grinder has a vertical adjustment and is provided with a Westinghouse ¼-hp. motor running at 3400 r.p.m. Equipment includes a grinding wheel ⅜ by 6 in., an extension mandrel for internal grinding, which is fitted with a ⅜ by 1½-in. wheel, a tooth rest for cutter grinding and an electric attachment plug with 7½ ft. of cord.—Gilfillan Bros. Smelting & Refining Co., Los Angeles, Cal.



Left to right, Russ welding, cutting and carbon-burning outfit; Hyway timer, and Goodrich engine-testing valve

The Readers' Clearing House

The Electric System

Wiring of 1913 Alco

—Publish a diagram of the generator and lighting system on the 1913 Alco.—James E. Rooney, West Albany, N. Y.

This is shown in Fig. 4.

Recharging Ford Magnets

Q.—In the Jan. 24 issue was published a method for recharging or remagnetizing Ford magnets by use of storage batteries connected in series. It was not stated which terminal of the battery to connect to the front and which to the frame of the car. Which is the correct one, the positive or negative?—Charles L. Erskine, Algona, Wis.

The positive terminal of the battery is connected to the magneto terminal on the flywheel housing and the negative to the frame.

Increasing Generator Output

Q.—Explain how to increase output of generator of Gray & Davis Ford starter single-unit type M. G. 9.—Clarence Ike, Kansas City, Mo.

The regulator controlling the generator output is located on top of the generator. Remove the cover to the regulator and it will be noted that there are two contacts which are adjustable. Greater tension on these contacts gives greater output from the generator. It is important when adjusting the regulator that the load be distributed evenly between the two field coils, as if the regulator is adjusted so that one coil carries all the load it will result in trouble. The maximum output of the generator should not exceed 10 amp.

Details of Edison Rectifier

Q.—Show wiring diagram of the new Edison vibrating rectifier for charging lighting and starting batteries. Explain it in detail as much as possible.—D. L. Adair, Rotan, Tex.

A wiring diagram of the Edison rectifier is shown in Fig. 1. Two other views of the instrument are shown in Fig. 2. The primary circuit taken from the alternating-current mains by the cord B embraces the primary winding of the transformer T, condenser C and the coils P of the vibrating units.

The secondary circuit from the transformer embraces the carbon and copper contacts N and O, which pass only the positive waves of the alternating current for charging batteries and other duty. An ammeter and rheostat may be placed in this charging circuit if the current is to be varied, or fixed connection may be substituted on the base of the rectifier, if it is to be used for maximum duty of 8 to 16 amp.

The vibrating unit which operates in a manner similar to the action of a polarized relay consists of a permanent magnet M, the coil in the primary circuit P, vibrating armature of steel with removable carbon contact N, stationary copper contact O and the screw Q for adjusting the amplitude of the armature vibration. The vibrating armature of each unit is divided into two parts, which gives it flexibility, affords increased current capacity and minimizes sparking, the two leads being connected together in one circuit.

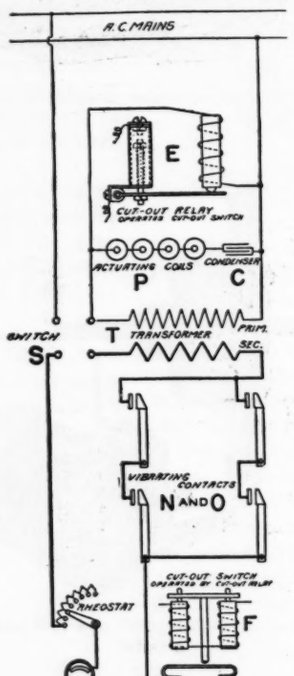
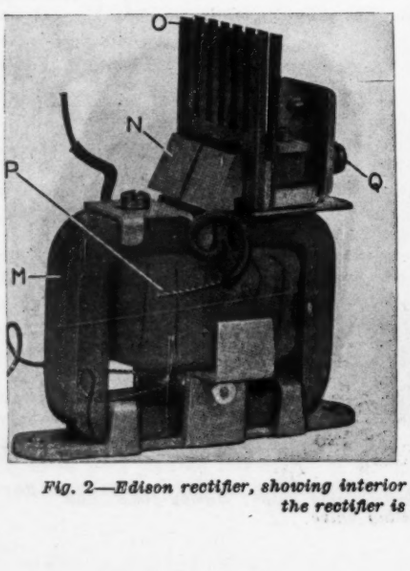


Fig. 1—Connections in Edison alternating-current rectifier



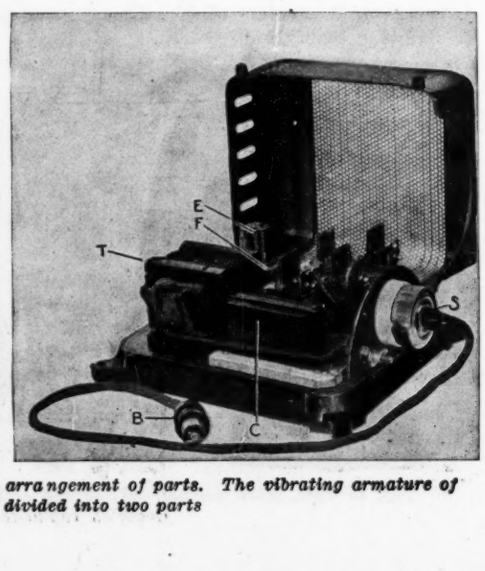


Fig. 2—Edison rectifier, showing interior arrangement of parts. The vibrating armature of the rectifier is divided into two parts

A primary relay and a secondary switch E and F close their contacts when current is flowing. Upon failure of the main alternating-current line they operate to open the charging circuit. A storage battery thus is prevented from discharging through the rectifier. Upon resumption of the main current, the rectifier starts automatically.

Increasing Charging Rate

Q.—I have a Scripps-Booth Model C Bijur motor-generator system. Field winding burned out; have had it rewound and installed with following result:

When switch is thrown on and motor starts cranking the engine the gage shows discharge. Immediately after the engine starts the gage shows charge up to a certain speed when it returns to discharge. Can run engine and battery but cannot get up speed enough to run the machine. The shunt wire is connected to the negative battery terminal. Is this correct?

Show diagram of the wiring, showing markings on battery and generator or suggest where the trouble lies.—T. J. Lewis, Milwaukee, Wis.

It is characteristic of these generators to have the charge rate decrease after a certain engine speed is reached. In your case the generator should charge about 10 amp. at 20 m.p.h. If the charging rate is less than this it can be increased by advancing the third brush regulator in the direction of rotation until the charge rate is as stated above. A wiring diagram of this system is shown in Fig. 3. The connections for the shunt wire are shown in the illustration.

Wiring of Nyberg and Ford

Q.—Can you furnish a diagram of the Jesco starter on the Nyberg 1913 car? It is a 24-volt battery. We need most the line from battery to the switch.

2—Furnish diagram of an Apelco outfit on a Ford.—Cresco Auto Co., Cresco, Iowa.

1—This is shown in Fig. 5.

2—This is shown in Fig. 6.

Miscellaneous

Lever Slips Out of Place

Q.—I have trouble in shifting gears of my 1915 Studebaker. When I shift into intermediate going up grade, I have to hold the shifting lever with my foot to keep it from slipping out of gear. It never slips out going down hill.—Subscriber, Susanville, Cal.

This is probably due to the shifting arm being bent or the shift rod not being of sufficient length to permit proper engagement of the gears. This can be determined by removing the cover of the gearset and then placing the gears in second speed and observing whether or not they line up properly when engaged. If the shifting arm or finger is bent it will have the same effect. If the shifting lever is too short it can be adjusted to the proper length, so that the gears will line up with each other.

Wants Pump Circulation

Q.—My 1915 Chevrolet has a thermosyphon system of cooling. How could this be changed into a centrifugal pump circulating system, such as is used on the 1918 models? What

would be the approximate cost of the parts needed?—B. B. Southerland, Brooklyn, N. Y.

To change from a thermosyphon to pump system would mean a great deal of work. The water openings would have to be changed, means devised for driving the pump, besides figuring out a suitable location for the pump. Inasmuch as the present system of cooling works out satisfactorily on your car, why not leave it as it is? The expense of making the change, we believe, would not be warranted by the results. However, you might take up the matter with the Chevrolet company, but the local branch of the concern does not advise the change.

Wants Steam Car Information

Q.—Can the Stanley and Doble cars maintain for long distances as high speeds under various kinds of adverse conditions where power is the limiting factor as high-grade gasoline touring cars can maintain under the same conditions?

2—Can they be driven as slowly in exceedingly rough and difficult places as an expert can drive a gasoline car in low gear when slipping the clutch?

3—Can they be driven as slowly on a garage floor as a gasoline car can be driven in low when slipping the clutch?

4—Can they pick up from 2 to 10 m. p. h. as quickly as a good six-cylinder in intermediate?

5—After being slowed down in a long bad sand bed could they pick up, while in it, to as high a speed as they could have maintained had they not been slowed down, the conditions being such that a gasoline car would have to be shifted to a lower gear when it was slowed down and was then unable to be shifted back to the higher gear while in the sand?

6—Is it necessary to move the hook-up pedal more often than shifting gears in a gasoline car?

7—Will pushing the hook-up pedal all the way down cut off steam at the ports. If not, what safety device is used to prevent the car's starting if some one unthinkingly should move the throttle lever?

8—Can the throttle lever on steam cars be operated easily with two fingers, without taking the hand off the steering wheel, the same as the throttle on a Ford?

9—Is the unsprung weight on the rear wheels any greater than it would be in the same size gasoline car having a torque tube and transmission on the axle?

10—Could a steam car have the throttle operated by a finger lever and a pedal like a gasoline car?

11—Could a steam car have two steam heaters, one on the floorboards in front and the other in the rear using exhaust steam, the condensed water to be returned to the supply tank?

12—Does cold water lower the maximum power of a steam car more than that of a gasoline car?

13—Would it be practical to have shutters on the condenser operated automatically by the pressure in the condenser, to cut down the draught of cold air on the boiler in cold weather?

14—Can anti-freezing solution be used in a steam car? If not, what can be done to keep the water in the supply tank from freezing without draining?

15—Can the engine be used as a brake on long hills?

16—Is any more fuel consumed getting up steam on a cold morning in a Doble than warming up a gasoline engine of the same power?

17—Will the electric hot point in a Doble ignite low-grade coal oil when the temperature is about zero?—Walter Catchings, Perrin, Tex.

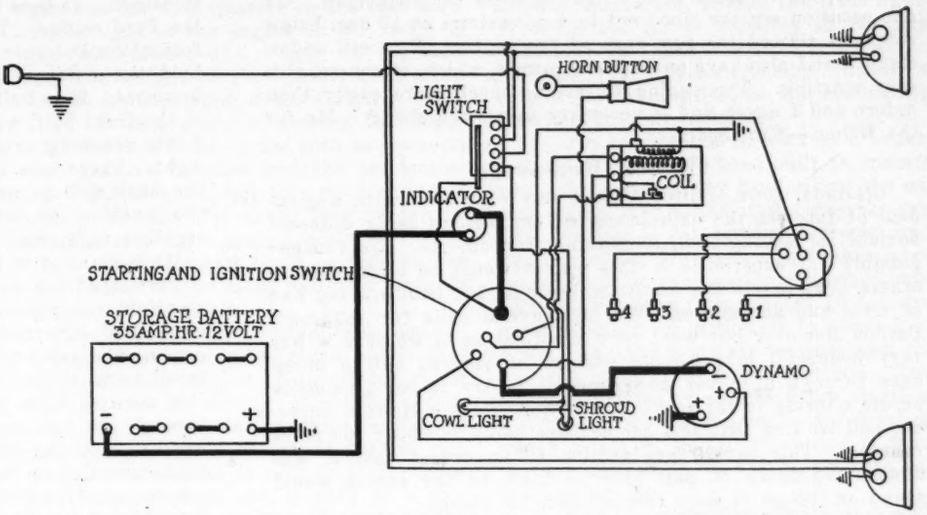


Fig. 3—Wiring diagram of the Bijur electric sys tem on the 1915 Scripps-Booth

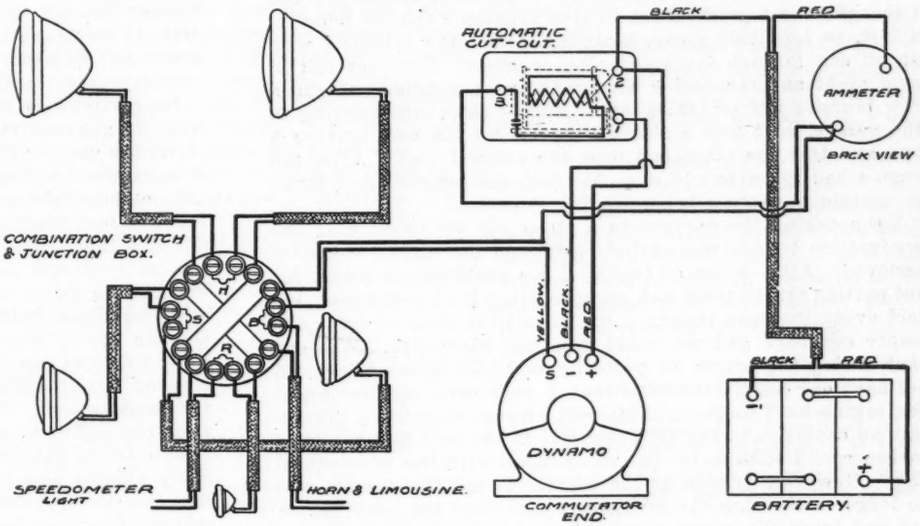


Fig. 4—Gray & Davis starting and lighting system installed on the 1913 Alco

1—Although gasoline cars under such ideal conditions as the Sheepshead Bay speedway can maintain higher speeds than the steam car, under actual road conditions the steam car, according to the makers, gives a higher sustained mileage. Steam cars also will hold pressure for long continuous

These Are Others' Experiences—What Were Yours?

Auxiliary Air Devices

Chicago, Editor MOTOR AGE—My experience with steam and air devices has covered a period of three years.

First I had an Oxy-Generator put on a Buick little six D-45. This car had run 24½ miles per gallons. As soon as the Oxy-Generator was put on, it would misfire at all times. In the first place they drilled three holes in the manifold instead of one. Anyone might have known that all that air going in above the carbureter would be too much. In order to save gasoline I removed the outfit and returned it to the selling company. If this air had been regulated from the steering post and turned on when the engine was hot the results would have been better.

Next I made a copper tank to hold 1 gal. of water. This tank was strapped over the hot exhaust pipe and supplied live steam for 50 miles. This was controlled from a shut-off valve on the steering post and turned on as soon as the engine was hot. After 2000 miles I found just as much carbon and just the same mileage per gallon; at the same time I could not keep a good carbureter adjustment.

Then I removed all this junk and put on a new Buick hot-spot manifold. The result was more power and more mileage per gallon. I think these air and steam devices may be all right where there is a rich mixture in the carbureter. My experience is that there is no economy where the air inlet is above the carbureter. We know that engineers have tried to use various air devices and found them no good. Where is the so-called air plug that flooded the newspapers with advertisements and the city with plugs about two years ago? It is well known that you can't fool the people all the time.—Emil Schuler.

Manifold Heaters

Clinton, Iowa, Editor MOTOR AGE—I wish to tell you in this column of the success I have had with a Buick D-35 equipped with Wilmo Manifold. This method was installed in 1 hr. and has certainly proven most satisfactory in every sense of the word. I have now used it five months and was getting, before putting on the equipment, an average of 20 m.p.g., whereas my present average is 24 miles. After equipping with the Wilmo I found it necessary to reduce the gasoline at the needle valve one-quarter turn, and I find that my engine runs smoother and starts easier than ever before.

The cost of this equipment was $11 installed, and I certainly

would spend it again if I bought another car to-morrow. On one occasion my car stood out in a snowstorm at 12 deg. below zero and started the first turn of the engine. You will understand that I also have an Imperial primer, which, of course, aids easy starting. The engine warms up much more easily than before and I never find it necessary to use the choker. Me for the Wilmo.—Karl Seesser.

Carbon Removers

Clarinda, Iowa, Editor MOTOR AGE—We read with a great deal of interest the experiences of car owners using different devices for saving fuel, eliminating carbon, etc. We thought possibly our experience in this matter would be of interest to others. We are in the hardware business but handle a big line of tires and accessories. We had several calls for Johnson's Carbon Remover but were very skeptical as to whether it was very beneficial in removing carbon. I ordered half a dozen cans through a jobber and resolved to try it out personally before offering it for sale. The writer drives a Hudson Super-Six and we find that this car carbons badly in about 500 miles running. This caused pre-ignition to an extent that it was almost impossible to pull hills on high, as the engine would sound as though it were tearing itself to pieces.

I had the garage man ride with me and he told me to bring the car around the next day and he would clean the carbon out. I thought this a good chance to give Johnson's Carbon Remover a test, so used half a can, squirting it into the cylinders with an oil can through the spark plug openings. This was left in over night and the engine started the next morning and run a few minutes before taking out. An old shirt was hanging in the garage, so I tore a sleeve out, tied up one end, making a bag and tied the other end over the exhaust pipe. After the engine had run about 10 min., the bag was removed and found to contain possibly a tablespoonful of carbon.

Upon taking the car out to a steep hill we found that the pre-ignition trouble was entirely gone and the carbon evidently removed. After a test of this kind, we could see no reason for not putting this in stock and recommending it to customers. We told every customer that if it did not do the work to bring the empty can back and we would give him his money. Will say that during the season we probably sold 1000 cans and we did not have one complaint except that in some cases the user found the engine hard to start. This was because they could not obtain an explosion in the cylinders, due to the fact that the loose carbon would stick under the valve faces, with loss of compression. However, as soon as the engine started this trouble was no longer noticed, as the explosion would blow the loose carbon out and leave the valves clean. A common expression that we use when selling Johnson's Carbon Remover is that you could wipe the carbon out with a toothbrush. We have not heard of a single case of trouble resulting from the use of it.—W. G. Dunn.

Manifold Heaters

Cortland, N. Y., Editor MOTOR AGE—In response to your request for expressions of experiences of motorists relative to the use of the heated intake manifold would be very glad to relate my personal tests, as I have been much interested in seeing what I could do. I have a 1915 Ford touring car and have tried several devices for gas saving. The device that I have now is a Hoag manifold superheater. Unreservedly and without any partiality it is the best invention and contrivance for the conservation of gasoline and improvement in the mileage of a Ford car that I know of.

It is manufactured by Frank J. Hoag, 91 Elm street, Cortland, N. Y., and costs $6 installed, requires from 20 to 30 min. to attach. It does not interfere with the regular equipment of the Ford engine. The invention consists of a very ingeniously formed jacket surrounding the manifold, covering more than half the external surface thereof, reaching far out on the branches. It is built in two parts, the back half corresponding to the front half, with asbestos packings in the joint and in the joints reaching around the manifold, making it entirely gas-tight. There is a cavity between the jacket and manifold on the back side as well as on the front side reaching all around the manifold on the inner side. The two halves are fastened together with small screws.

Its manner of working is simplicity itself, and is as follows: A portion of the waste exhaust heat is taken from the exhaust manifold and passed through flexible metallic tubing on a nice curve and impinged against the manifold in the center, thus causing the gases to be scattered in all directions, circulating it to all parts of the superheater. After it has been circulated in this manner, it is passed down through another flexible tube, through the pan and out into the open, where no one will see, smell or hear it. The process of circulating this waste exhaust heat causes it to become exceedingly hot, so much so that no person could possibly hold his hands on right and left hand branches of it. The space underneath this jacket becomes sizzling hot, so that when the liquid gasoline passes from the carbureter through this manifold on its way to the various cylinders, it meets with the inner surface made very hot by the action of the exhaust heat and is compelled to turn to a very nice dry vapor making it become more combustible.

Its principle is that of dropping a liquid on a hot piece of iron; it goes up into vapor very quickly and the hotter the plate, the quicker it forms into vapor. This is exactly the way it works in the Hoag invention—the raw gasoline as it strikes the hot manifold must by necessity be compelled to transform into a vapor, eliminating the former tendency to enter the cylinder as a liquid with carbon deposits as a result.

I have always been interested in how many miles I could obtain on a gallon of gasoline. The best that I have ever done with my Ford before installing a superheater was 18 m.p.g. On one of my trips with the Hoag manifold superheater attached I made just 174 miles on 5 gal., or 34⅘ m.p.g. The road covered was up hill and down and included state road and country roads as well. To obtain this result I turn the needle valve from one-eighth to one-fourth of a turn and observe other rules conductive to gasoline mileage. I have used this superheater for many months and never have noticed any bad effects, but on the other hand, it not only gives me more mileage but the engine will throttle down better, run smoother and pull better on a hill, with tendency to fouling of plugs eliminated.

Another noticeable improvement is in starting with a cold engine; the latter will warm up in less than half the time, allowing one to get away sooner under full power. I am satisfied that the carbon nuisance is much reduced in my engine, for as a consequence of the hot manifold compelling the heavier and less volatile elements of the gasoline to more thoroughly vaporize, it is not left in the interior of the engine as when no superheater is used.

To obtain the best results from gasoline, it will be necessary to make use of the heated manifold and with the ever descending gravity of fuel which we are compelled to use to-day, no one will ever regret if they make use of this device. I can see no reason why anyone should not obtain good results from its use if directions are followed. I for one would not part with mine for many times its cost, for I figure that it has not cost me anything as it soon paid for itself.—Calvin Priest.

grades, it is stated, in regard to their performance.

2—There is practically no limit to the slowness with which a steam car can be operated. With full boiler pressure the steam car driver has, with the throttle, an infinitely fine control over the steam to the engine, and the throttle alone will give any speed or power that is necessary to move the car.

3—A steam car can move so slowly that it is almost impossible for the observer to see it move. This is true either in forward or reverse. The Doble is said to be able to go up steep grades at a speed of less than 1 m.p.h.

4—In a steam car it is not necessary to build up engine and flywheel speed for acceleration, but the power is stored ready for use and is available instantly On acceleration tests on 15 per cent grade, the Doble-Detroit steam car, it is said, has shown that, with all four wheels on the grade, from a standstill it would accelerate to 15 m.p.h. in 5 sec.

5—Owing to the fact that at no point in the entire range of speed or the entire range of power in a steam car is the load disconnected from the power, faster and smoother acceleration is possible under unfavorable road conditions than with any type of power necessitating gearshift with attendant clutch disconnection and engagement, say the makers of the Stanley. According to the makers the Doble car could be brought to a standstill, pick up in a heavy sand road and accelerate. It will pull out of holes easily, due to the fact that the engine is geared direct to the rear axle, giving at all times a maximum torque at zero speed.

6—On the Stanley the only time it is

necessary to move the hook-up pedal is in starting the car. After the car is under way the pedal is pushed in and left there. In the Doble it is not necessary to move the hook-up pedal at all. This is done simply for economic running. For instance, if you are traveling at 20 to 25 m.p.h., the cut-off can be hooked up an eighth of the stroke, but the hook-up pedal need not be used at all.

7—When the hook-up pedal is pushed all the way down the valve motion is reversed and the engine operates in the other direction. On the Stanley no pedal-locking device is provided, nor is one necessary, at the middle point where the valves would be neutral. As the car can be started only by opening the throttle, the latter is provided with a latch which locks it in closed position when the car is standing. To prevent the car being started by moving the throttle unintentionally the Doble is arranged so that when the throttle is all the way down, it drops into a slot, locking it. The throttle cannot be moved up from the shut-off position without pressing a spring on the under side.

8—The throttle lever can be operated easily with two fingers without taking the hand off the steering wheel on the Stanley and Doble cars.

9—The unsprung weight is approximately the same as it would be in the same sized gasoline car with gearset on the rear axle. The weight of the engine on the Doble is divided between the weight on the axle and the weight on the flexible steel strap on the crossmember of the frame.

10—It is possible to connect the finger throttle with a foot pedal such as connects the gasoline throttle and the accelerater on a gasoline car, but this practice is not recommended. The finger throttle can be manipulated much more exactly.

11—Steam heaters could be used on the floorboards in the front and rear seats, if it seemed advisable.

12—It is difficult to draw this comparison, as the water in the steam car is used solely for the purpose of generating steam and not for its cooling properties. However, the same insulation which retains the heat in the boiler protects it against cold and as the radiator is entirely independent of the powerplant and is used as a condenser only, the rapidity of condensation does not affect the efficiency of the car.

13—It would be possible but not necessary to place the shutters on the condenser, as the boiler is well insulated against cold air which comes through the condenser.

14—Owing to the fact that the water reservoir on the Stanley is in the direct path of the heat from the boiler flue, it is not likely to freeze as long as either the pilot or main burner are in operation. The makers recommend leaving the pilot lighted while the car is standing in freezing weather. On the Doble alcohol is used in the water to prevent freezing. There is very little evaporation, as the condensing system is entirely inclosed.

15—The engine can be used as a brake, and steam cars have been built to operate without brakes of any kind, using the engine as the only means of stopping the car. This practice is not general, however, and steam cars are provided with brakes large enough to meet extreme touring conditions.

16—In weather from zero to 10 deg. below the Doble car will start in about 3 or 4 min. In more moderate temperatures the car will start in much shorter time. Two hundred pounds is sufficient for starting, and the normal steam pressure for running, which is 600 lb., will be generated in from ½ to 1 min. after the initial pressure has reached 200 lb.

17—The Doble ignition system, it is said, will ignite kerosene at any atmospheric temperature.

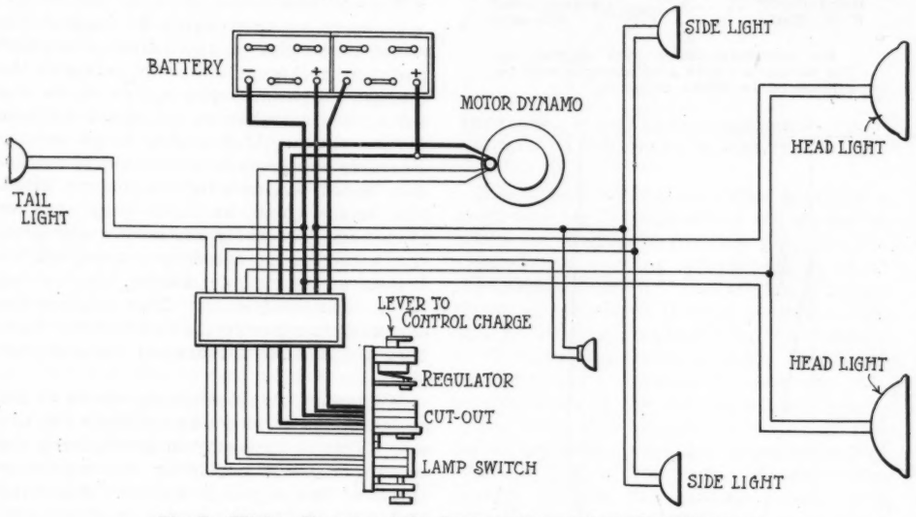


Fig. 5—Wiring diagram of the Jesco system used on the Nyberg car

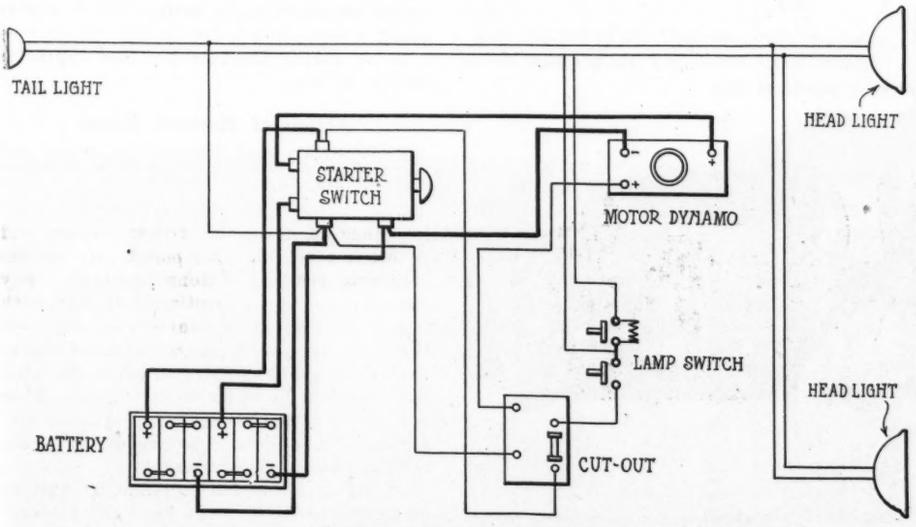


Fig. 6—Wiring diagram of the Apelco system used on the Ford car

Oil Leaks Into Timing Case

Q.—What is the cause of oil from the crankcase passing into the timing gearcase under pressure in a new Buick D-44 and what damage would it do?—Ray S. Wait, San Benito, Tex.

The crankcase and timing gear case are lubricated separately on this model. Any oil that may leak through from the crankcase probably comes through the main bearings. This would occur if the main bearing were loose or if the shims in the main bearing were not properly placed, leaving an opening through which the oil could enter.

Increasing Gear Ratio

Q.—What additional speed and saving of gasoline would be obtained on a Buick D-44, 60 hp. runabout, in changing the present 4 to 1 gear ratio to, say, 3 to 1, and would it prevent as fast a pickup or getaway as with the regular ratio? The country here is flat, with no sand. —Ray S. Wait, San Benito, Tex.

It is quite probable that this change would not affect the fuel consumption to any great extent, as the range of maximum economy lies within the limits of ordinary driving speeds. An increase in gear ratio will only make the car less active.

Cause of E. M. F. Knock

Jeane, Cal., Editor MOTOR AGE—In the Jan. 14 issue Mr. Hunt complained as to the knock in his E. M. F. I have had trouble with a similar knock which I located in the front bearing housing where it enters the crankcase. I remedied the difficulty by putting in three shims of sheet steel. To do this will require removing the timing gears and case.—M. L. Warnock.

Chain Carbon Removers

Q.—What is your opinion of chain carbon removers, and is there any possibility of harming the cylinders by their use?—D. C. Canfield, East Canaan, Conn.

No harm is done to the cylinders by the use of chain carbon removers. Some owners state that they have obtained good results with them, while others prefer some of the more recent forms of liquid carbon removers.

Engines

Interference of Exhaust

Q.—My D-45 Buick has a slight tapping sound at every revolution of the crankshaft which does not sound any louder when going

up a hill than on the level. It is much more noticeable when opening the muffler cutout. Pushrods are adjusted correctly and am unable to find any valves sticking. I have noticed several other models of this make acting in the same manner and have been told it is caused from the exhaust of No. 1 and No. 6 cylinders. What is the cause and remedy? The car runs beautifully except for this slight tapping sound which is rather annoying.—O. M. Root, East Cleveland, Ohio.

The noise that you refer to is caused by the exhaust from No. 1 cylinder interfering with the exhaust of the remaining cylinders at the point where the manifold makes the bend at the forward end of the engine. This is due to the exhaust striking the rapidly moving column of gases in the manifold. However, it does no harm and can be corrected only by the use of a different type of manifold.

Ignition on Gnome Engine

Q.—Explain ignition system of Gnome rotary engine.—E. A. Campbell, Argenta, Ark.

In the Gnome seven-cylinder engine there are three and a half explosions per revolution, or seven every two revolutions. The firing order is 1-3-5-7-2-4-6. In the fourteen-cylinder engine the firing order is the same, with one set of cylinders alternating with the other and giving twice as many explosions per revolution. The wiring of the ignition system is shown in Fig. 10. It will be noted that the brush A makes contact with the metallic sectors B as they pass. Each sector is connected with its corresponding spark plug C through wire D. As the sector passes over the brush a spark is produced in that cylinder and the charge fired. The high-tension cable E connects the high-tension terminal of the magneto F to the brush. On the earlier forms of the Gnome engine the magneto remains stationary and in an inverted position. The gear G is keyed to the magneto shaft and engages with the large gear H which turns the cylinders.

TO assist readers in obtaining as a unit all information contained in this department on a certain subject in which they may be most interested, such as ignition, carburetion, etc., MOTOR AGE has segregated inquiries into classes of allied nature. Questions pertaining to engines will be answered under that head, and so on.

THE ELECTRIC SYSTEM

James E. Rooney...West Albany, N. Y.
Charles I. Erskine.....Algona, Wis.
Clarence Ike.....Kansas City, Mo.
D. L. Adair.....Rotan, Tex.
T. J. Lewis.....Milwauke, Wis.
Cresco Auto Co.....Cresco, Iowa

MISCELLANEOUS

Subscriber.....Susanville, Cal.
B. B. Southerland.....Brooklyn, N. Y.
Walter Catchings.....Perrin, Tex.
Ray S. Wait.....San Benito, Tex.
M. L. Warnock.....Jeane, Cal.
D. C. Canfield.....East Canaan, Conn.

EXPERIENCES

Emil Schuler.....Chicago
Earl Seeser.....Clinton, Iowa
W. G. Dunn.....Clarinda, Iowa
Calvin Priest.....Cortland, N. Y.

ENGINES

O. M. Root.....East Cleveland, Ohio
George Hesse.....Chicago
E. A. Campbell.....Argenta, Ark.
Joseph A. Koontz.....Streator, Ill.
H. S. Hart.....Vinton, Iowa
Anselm Warner.....Hepburn, Iowa

CARBURETION

Reader.....Leland, Iowa
F. C. Ball.....Chicago

No communication not signed by the writer's name and address will be answered in these columns.

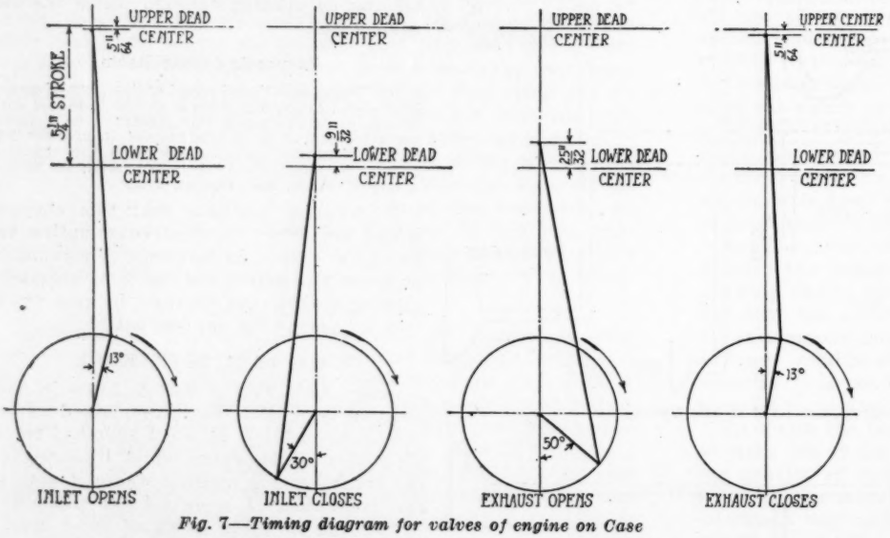


Fig. 7—Timing diagram for valves of engine on Case

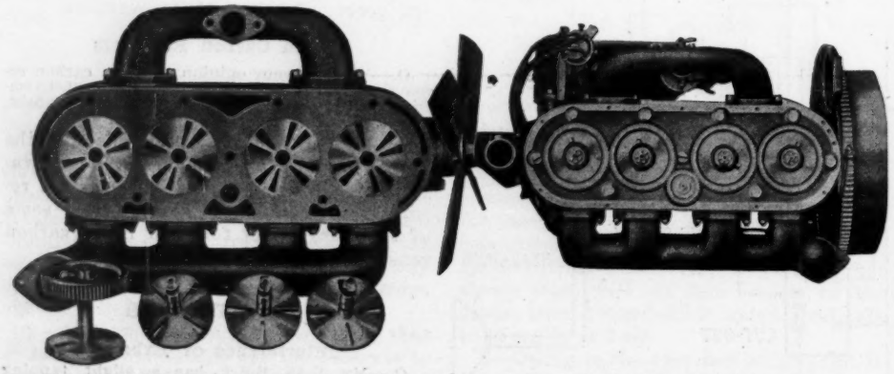


Fig. 8—Bottom view of Hackett engine with valves removed, showing the eight ports per cylinder, and right, the four spur gears operated by a small master gear

How to Figure Horsepower

Q.—Where can I get information on how to figure gasoline engine horsepower?—George Hesse, Chicago.

The N. A. C. C. formula, for determining horsepower is $\frac{D^2 N}{2.5}$ where D is the diameter of the bore in inches and N is the number of cylinders. This equation is based on an engine speed equivalent to a piston speed of 1000 ft. per minute, a mechanical efficiency of 75 per cent and a mean effective pressure of 90 lb. in the cylinders of the engine. Other methods of determining horsepower was described in the issue of Jan. 31, page 41.

Wants More Engine Speed

Q.—I have a Case Model O engine, a 1913 or 1914. I have this in a racing car and would like to know how to get more speed out of it. It is a T-head, 4½ by 5¼ in. and I would like to know what speed it should make with a 3½ to 1 axle.

2—How should I time the camshafts in this engine? As it is a double camshaft, it can be timed just right for speeding.—Joseph A. Koontz, Streator, Ill.

To speed up this engine we suggest you increase the size of the valves and valve ports, fit a larger carbureter, advance the ignition slightly, that is, set it so the spark occurs earlier in the upward stroke of the piston. If you care to go to considerable expense you could have the cylinders bored out and lighter pistons fitted. The latter could be light gray iron or aluminum, preferably the latter. Compression could be increased by planing off the bottom of the cylinder blocks, thus letting them down somewhat. This reduces the compression space in the combustion chambers and therefore increases the compression.

We cannot give definite figures as to the speed, inasmuch as we do not know the tire size. This is necessary in determining the miles per hour, providing the maximum speed of the engine is known. Assuming that your engine is capable of 2000 r.p.m. and the tire size 34 in., the car would travel about 60 m.p.h. with a 3.5 to 1 gear ratio.

2—A timing diagram for this engine is shown in Fig. 7.

Action of Hackett Valves

Q.—Illustrate and describe the valves and their action in the Hackett rotary-valve engine. —H. S. Hart, Vinton, Iowa.

Two views of the Hackett engine, showing the construction of the valves, are given in Fig. 8. The valves are of the rotary type, being of a disk pattern. Only one surface is in contact with the seat, requiring that only one surface be kept tight. Reference to the illustration shows that each valve is integral with the stem and operated by a single spur gear. Thus the valve action is positive; opening and closing of the ports is in proportion to the revolutions of the crankshaft.

A slight depression is made by cutting away the surface of the head in the large sectors between the ports. About 44 per

cent of the bearing surface is removed, forming a chamber between the valve and its seat, into which the cylinder pressure is introduced. A downward pressure thus is exerted equal to nearly half the total upward pressure, acting as a counterbalance and eliminating excessive friction, it is said.

The valves operate at an eight crankshaft speed, making lubrication a simple matter, it is stated. Inasmuch as they are located immediately above the pistons, they allow quick ingress and egress of the gases, as there are two intake and two exhaust ports per cylinder. The disks are exposed upon removal of the cylinder head, and the driving mechanism by removing the cover plate on top of the engine.

Carburetion

Dissembling Tillotson Carbureter

Q.—Explain manner of dissembling the Tillotson carbureter as used on the Overland. Also show how the nozzle is to be removed. Explain operation of the carbureter in detail.—Reader, Leland, Iowa.

You have not stated what particular model carbureter you have, but assuming it is like that used on the Overland 83, proceed as follows: First remove the needle-adjusting screw A, Fig. 9. Then the stuffiing box nut B can be removed. Next remove the air lock nut C and disengage the air horn. You are then free to unscrew the primary air tube and venturi by backing away on the nut D. After this has been removed you will find a small screw, E, which binds the primary venturi to the primary inlet. After this primary venturi has been released and removed you can insert a special socket wrench which the company furnishes on request, and remove the primary nozzle feed F.

All models of the Tillotson carbureter are equipped with an automatic air valve unprovided with an adjustment. The amount of gasoline used is regulated by the adjustment of the primary fuel supply nozzle. To find the correct adjustment first let the engine warm sufficiently and then close the throttle so the engine runs reasonably slow. Now turn the adjustment to the right or up, a little at a time, until the engine begins to slow down for want of fuel; then turn it back to the left about an eighth of a turn. This should give the correct mixture, and if all other conditions of the engine are normal you should obtain the best results.

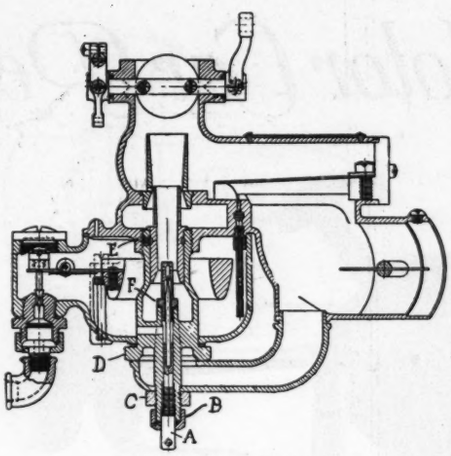


Fig. 9—Cross-sectional view of Tillotson carbureter, showing how it is taken apart

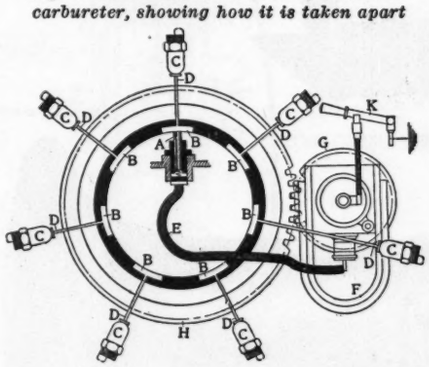


Fig. 10—Wiring of ignition system used on Gnome engine

The design of the air valve provides a small opening through which the air enters while the engine is running slowly. The area of this opening is designed to equal the requirements of the engine running slowly at the closed throttle position. This area is increased gradually by the yielding of the two flexible steel reeds that open by atmospheric pressure to equal the volume required by the varying engine speeds.

The reed cage provides a seat and the reeds should be assembled normally to lay perfectly flat on their seat. The maximum partial vacuum the pistons create will open the reeds only a small portion of their elastic limit, thus insuring long life for the reeds.

The volume of air that can pass through the air valve being predetermined to equal the requirements of the engine at all speeds, the correct mixture is obtained by placing the fuel-supplying nozzles in the path of air and providing an adjustment to regulate the amount of gasoline to be drawn through the nozzles.

The position of the secondary nozzle is such that it supplies gasoline at higher engine speeds only and as the primary nozzle supplies fuel at all engine speeds, an adjustment through the primary nozzle covers the mixture at all engine speeds. If the adjustment of the primary nozzle is made correct for the slow engine speeds, then the secondary nozzle, being correct size, will provide the higher amount for higher engine speeds. The secondary nozzle begins to deliver gasoline at partially open throttle and automatically discontinues when the throttle is closed again.

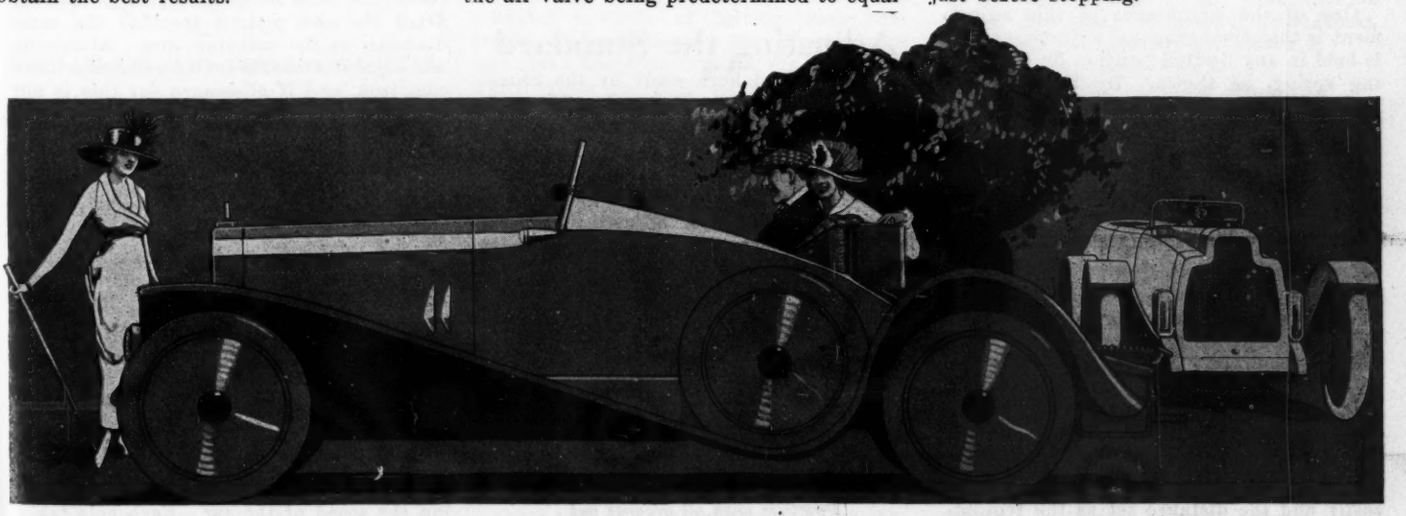
Warm air is essential in installing any model of this carbureter on any engine; means should be provided so that all the air entering the carbureter is drawn from around the exhaust pipe. A screen is provided in the gasoline inlet connection, which should be cleaned as often as necessary. The cold air shutter should be closed except during extreme heat. The choker valve in the air inlet should be closed for starting and opened immediately after the engine starts.

Since the engine receives seven sparks during two revolutions or three and a half sparks per revolution, the magneto runs one and three-quarters times as fast as the engine, giving a speed ratio of seven to four. Inasmuch as the cylinders fire alternately, 1-3-5-, etc., after cylinder 1 has fired the brush passes over the segment 2 without firing and then makes connection with segment 3, firing that cylinder. The switch K is used for stopping the engine. It is placed in the primary circuit.

Carbureter on Buick Leaks

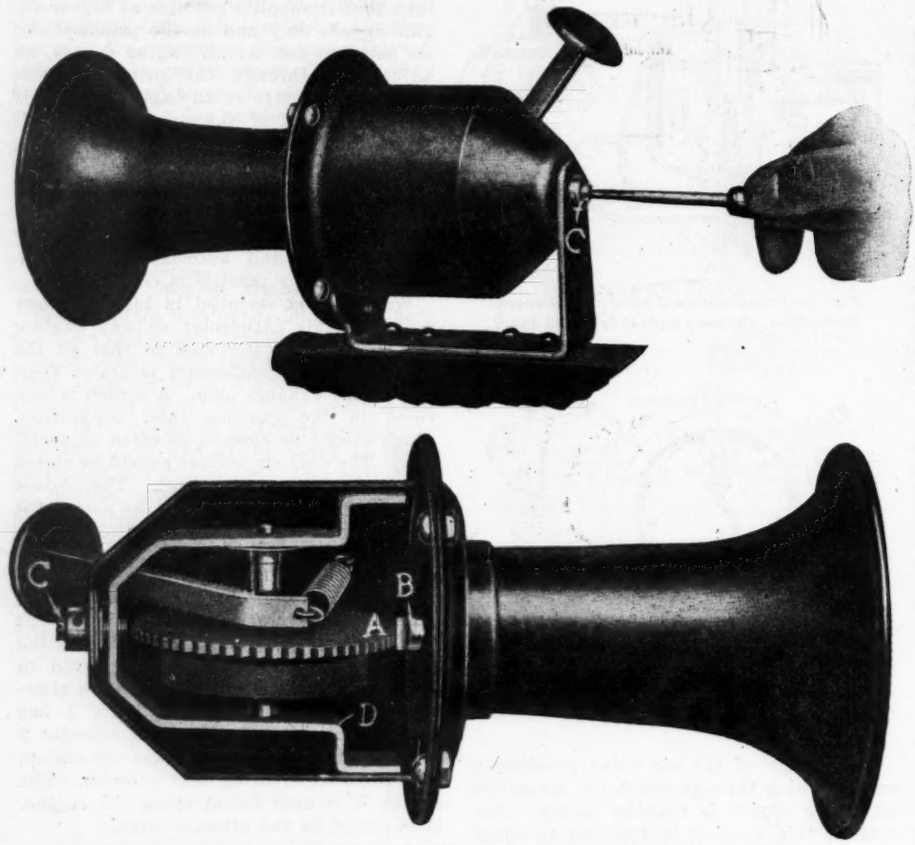
Q.—I have a light Buick D 45, 1916 model, equipped with a Marvel carbureter which floods and leaks almost every time the engine stops. Had it taken off, cleaned up, float and needle valve ground, but it still leaks. Can you suggest a remedy?—F. C. Ball, Chicago.

It does not seem from your description that the trouble is due to any fault of the carbureter, as it would leak constantly if this were the case. However, this may come from condensation in the manifold which runs back in the carbureter after the engine stops. This condition would be accentuated if the engine is accelerated just before stopping.



Designed by Kenworthy

The Motor Car Repair Shop



A slight turn with a screwdriver gives the choice of tone on the Standard horn

Adjusting the Benjamin

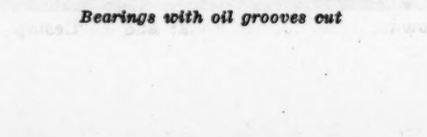
THE horns made by the Benjamin Electric Co., Chicago, are of the vibrator and motor-driven type. Sectional views of them are shown in the accompanying diagrams, giving the location of the parts where the adjustment for sound is made. On the vibrator model, which is arranged or wound for operating on any desired voltage, adjustment is governed entirely by the contact screw.

One of the advantages of this adjustment is that the hexagonal adjusting screw is held in any desired position by the locking spring, as shown. By this arrangement the contact screw can be advanced or backed off a sixth of a turn at a time and locked securely in position, without the necessity of locking screws. By advancing the screw, or when the break at the contacts is at a minimum, the tone pitch of the horn is raised in proportion. If a deeper tone is desired, the contact screw should be backed off so the gap between the contacts when the latter are separated is at least $\frac{3}{32}$ in.

The armature of the motor-driven signal is held in position and floats on a supporting spring, so shown in the diagram. Therefore, the adjustment of the toothed ratchet wheel in relation to the hammer point riveted to the diaphragm is controlled easily and the distance set as the requirements demand. The advancing or backing off of the complete armature, and consequently the ratchet wheel, is controlled by the screw at the top of the motor shaft. The latter also serves as the top bronze bearing of the shaft itself. By advancing or backing off this combination screw the entire armature and ratchet wheel can be placed in any position desired and locked in this position by tightening the clamping nut. In this way the volume of quality of tone can be varied to suit requirements.

Adjusting the Standard

The Standard horn made by the Standard Auto Horn Co., Somerville, Mass., is adjusted with a screwdriver, and the operation can be performed while the car is running, inasmuch as the adjusting screw is located on the outside and back of the horn. The manner of adjusting it, with an interior view of the horn is shown in the illustrations.



Bearings with oil grooves cut

The construction of this horn is such that a sliding frame, D, upon which is mounted the ratchet wheel A is brought closed to or away from the diaphragm B by the adjusting screw C. One of the illustrations shows the screwdriver in contact with the adjusting screw. A slight turn to the right lengthens the duration of the blast, while a turn to the left shortens it. This is all there is to adjusting the horn.

There is no locknut or similar device to loosen up before regulating the tone, for the adjusting screw is held by friction and hence self-locking. If desired the driver can steer the car with one hand and make the horn adjustment with a 10-cent piece held in the other.

As will be noted the adjusting screw is threaded to fit a tapped hole in the back of the carrier D, consequently when the screw is turned to the right, the carrier is drawn toward the rear, at the same time taking with ti the toothed wheel A away from the diaphragm. The thread on the screw C is quite fine, hence a very delicate adjustment can be made. Usually it is only necessary to turn the screw about a quarter turn.

Rebuilding for Speed

Many owners desirous of increasing the speed of their cars write us about aluminum pistons and setting the valves ahead. Both are all right, if intelligently dealt with. Often owners are greatly disappointed when after equipping the engine with aluminum pistons the car speed is not increased over 2 or 3 m.p.h. It is quite true that lighter pistons will reduce the weight of the reciprocating parts and in this way permit greater engine speed, but it should not be expected that the final car speed will be increased 10 or 15 m.p.h. as some people expect.

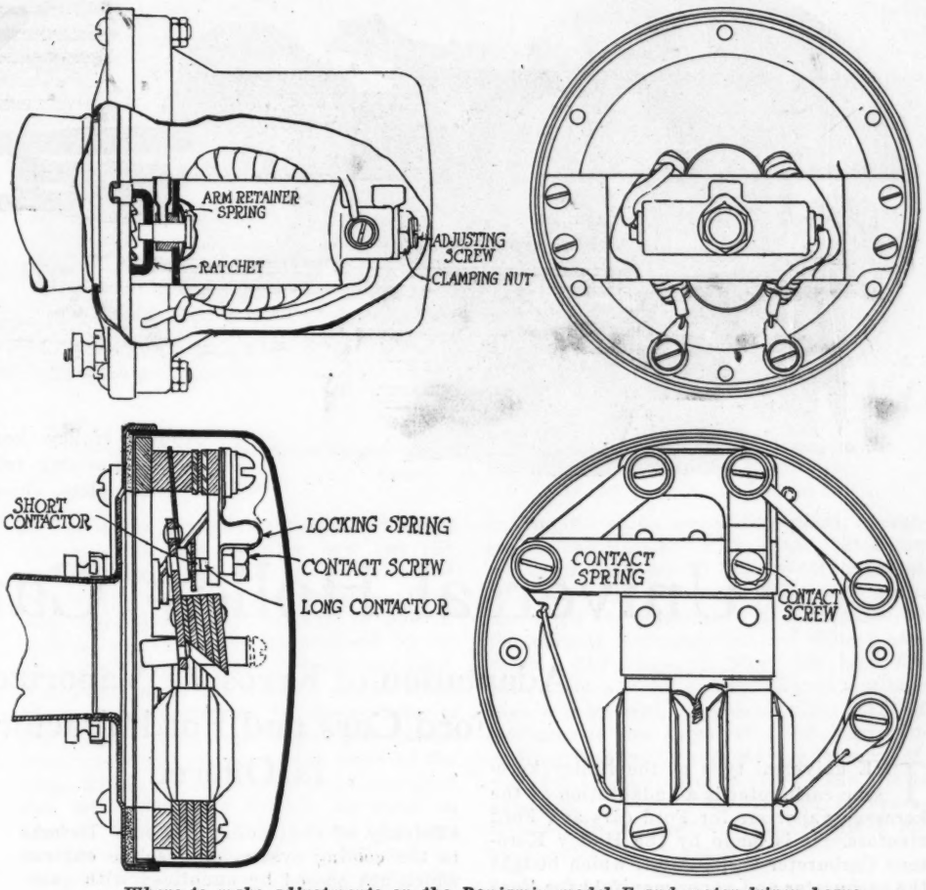
Frequently owners write us that they have just had alloy pistons fitted in their engine and after driving 15 to 20 miles, during which the engine had a tremendous amount of power, it began to slow down and finally ceased running altogether. The reason for such behavior is plain. Whoever fitted the new pistons specified the same diameter as the cast-iron ones. Aluminum has a greater coefficient of expansion than cast iron, and if allowance for this is not made, the above trouble is sure to follow. The best way to order alloy pistons is to tell the manufacturer that they are to replace such and such-sized cast iron pistons. Or, better yet, send him one of the old pistons.

About setting the valves ahead. This is all right if the engine is going to be run at high speeds all the time. Remember that at low speeds the explosion is too early and a tremendous strain is thrown on the pistons, connecting rods and bearings. Sometimes cams are tapered to produce a quicker lift, but this is a very delicate job and had better be left to a competent man. Pistons and connecting rods often are drilled with a view to increasing the speed of the car. Each hole takes

away from the strength of that part, and nowadays these parts have been designed by the makers to be as light as possible and yet have necessary strength. It stands to reason that where an owner attempts to cut away or add to the engine's vital parts, he is upsetting the designers' work. Every engine of recent date has been designed to do certain work and within certain limits, and it is better to drive along safely at 50 m.p.h. than 60 with a doctored engine that may at any time punch a hole through the crankcase.

Oil Grooves in Bearings

The function of oil grooves cut in bearings is to distribute the lubricant between the shaft and bearings so as to lubricate both surfaces. The way in which these grooves are cut has much to do with the results obtained. The illustration shows a cross-sectional view of two bearings in which such cuts have been made. At A is shown a U-shaped cut which should be avoided. The correct form is shown at B. It should have a rather flat V-section and not a semi-circular or U-shaped section. The reason for this is that the U-form of groove has a sharp angle with the shaft and there is a tendency to scrape or wipe the oil from the shaft. On the other hand, with the shallow V-form the angle is not great enough between the sides of the groove and the shaft and the distribution function is perfectly accomplished.



Where to make adjustments on the Benjamin model F and motor-driven horns

N. A. D. A. PLANS BRANCH OFFICES

St. Louis, Mo., Feb. 18—Bart J. Ruddle, secretary of the National Automobile Dealers' Association, was here Friday for a conference with President F. W. A. Vesper. They decided that:

Branch offices in charge of assistant secretaries will be opened in St. Louis and Washington. The Washington office will be in the building occupied by the National Automobile Chamber of Commerce.

A legislative committee will be appointed for each state to report to the association on pending bills affecting selling, making and using motors cars.

The roads campaign will be made a means of relieving the freight problems, it being shown that over good roads and in good weather driveaways from the factory can be extended considerably more than the arbitrary 500 miles.

JORDAN TO ADD $200,000 CAPITAL

Cleveland, Ohio, Feb. 15—A 50 per cent increase in the production of Jordan cars, made possible by a largely increased demand and the immediate acquistion of $200,000 additional capital, and the placing of Jordan stock on a definite dividend-paying basis, is part of a plan announced after a meeting of the board of directors following the annual stockholders' meeting held last week.

Jordan has, during the last year, done, a business of approximately $3,000,000 on tal, which is equivalent to 66.8 per cent for the year.

The new plan provides for the sale of $200,000 of preferred stock now in the treasury, with one-half share of common stock given as a bonus with each share of preferred. This stock would be fully paid and non-assessable. The preferred stock now held by the original stockholders, together with the new preferred issue, will be placed on a 7 per cent annual dividend basis, to be paid quarterly.

TRUCK CONTRACT METHOD

New York, Feb. 16—That the present method of allotting contracts for military trucks, whereby the Government deals directly with the various makers, is the best method and should not be changed was the consensus following a joint meeting of directors of the National Automobile Chamber of Commerce and the Motor and Accessory Manufacturers' Association on Wednesday. The meeting was called to consider methods of letting such contracts. A unanimous vote of confidence was given Christian Girl for the manner in which he is carrying on his work. The matter of placing more prominently before the public the inherent advantages of motor haulage as means to help relieve railroad congestion is being considered.

CHANGES IN MAIBOHM CAR

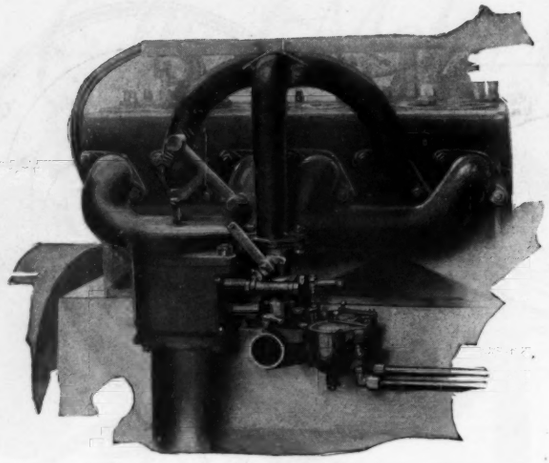
Racine, Wis., Feb. 16—Coincident with the offering of two new body styles, four new color options and one new upholstery option the Maibohm Motors Co. is revising its prices, to take effect March 15. A five-passenger touring and a two-passenger speedster body have been added to the line. The five-passenger is designed for the use of two auxiliary tonneau seats. The new color options include deep maroon, powder blue, tourist khaki and battleship gray. An option of Spanish or black upholstery is offered in all open models. The prices are: Roadster speedster and speedster, $830; four-passenger and five-passenger phaeton, $1,050; sedan, $1,650; demountable winter top, $90; two auxiliary tonneau seats, $30.

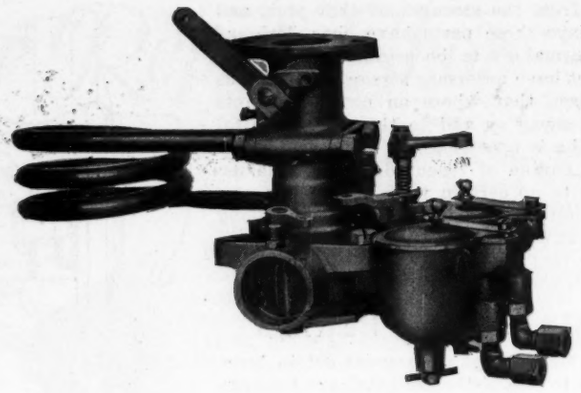
HIGRADE IN PRODUCTION SOON

Harbor Springs, Mich., Feb. 15—The Higrade Motors Co. is just about to get into production. It will start on a preliminary schedule of twenty-five cars, for which the materials are now on hand. The materials for another 100 cars are practically all in, and indications are that a production of from twenty to twenty-five of the light trucks weekly soon will be made. According to present indications, production will start about March 1.

ANALYSIS OF CAR OWNERS

Detroit, Feb. 16—Analysis by the Packard Motor Car Co. of the 1500 owners of its third Twin-Six cars shows that forty-two are owned by farmers and ranchers, thirty by growers of and dealers in cotton and wool, twelve by breeders of and dealers in livestock. Among 442 manufacturers who own new Twin-Sixes are makers of all kinds of products from farm implements and shoes to silk and ice. The new cars are owned by 325 bankers, sixty or sixty-five coal and lumber dealers; 274 merchants; thirty-seven real estate men, fourteen publishers; 116 doctors, lawyers, clerks and artists; twenty-seven public officers; twenty-three hotel and apartment owner-managers; twenty-one chemists and thirteen engineers.





Above, Holley kerosene carbureter complete with vaporizing tube and, left, the carbureter complete, showing typical installation

Universal Holley Carbureter

Adaptation of Kerosene Vaporizer for Ford Cars and Ford Tractors Is Offered

THE universal type of the Holley kerosene carbureter is an adaptation of the kerosene vaporizer for Ford cars and Ford tractors. It is made by the Holley Kerosene Carbureter Co., Detroit, which bought the carbureter and vapor manifold for Ford cars from Holley Bros. Co. The Holley gasoline Ford carbureter has been sold, with the facilities for manufacturing it, to the Ford Motor Co.

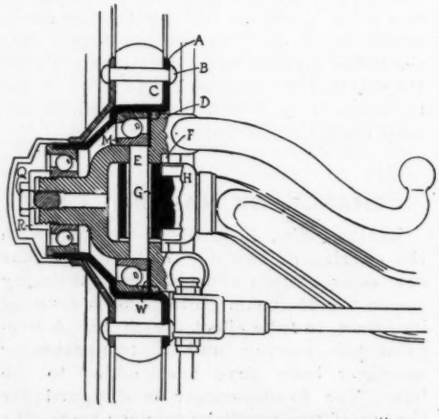
The universal Holley carbureter can be adapted to any type of engine. It is installed by making simple changes in the manifold castings to include the heating coil which is a part of the system. The device is designed to use any hydro-carbon fuel with a final boiling point below 600 deg. Fahr. Starting is with gasoline, and the feed is switched to the heavy fuel for running after warming up. Two float chambers care for the fuels.

The principle of operation first provides a primary mixture by a needle valve and a very small aspirating jet which gives a mixture that is too rich for combustion. The rich mixture of atomized fuel and air is carried through a coil tube of very thin wall thickness exposed to the exhaust gases directly in the exhaust manifold. The temperature in the tube reaches 500 deg. Fahr. From this coil the rich mixture is led directly to a mixing chamber where additional air enters, putting the mixture into proper condition for combustion. The opening of the air in the mixing chamber is governed by the suction of the engine and by the opening of the throttle valve.

To install it is necessary to arrange the manifold casting to inclose the vaporizing coil. A device with a by-pass controls the amount of exhaust heat coming into contact with the vaporizing coil. The application depends upon the design of the engine. The average gasoline powerplant should have the compression reduced to avoid overheating and consequent pounding, but the amount of the reduction is a matter of experiment and depends on the efficiency of the cooling system. Defects in the cooling system of gasoline engines which are passed by unnoticed with gasoline fuel come into prominence when kerosene is used and are denoted by preignition and consequent pounding. It is possible to maintain the high compression by the introduction of water in the form of steam into the intake manifold, and this can be done by locating the water injection pipe near the exhaust manifold and using the heat therefrom.

There are also some details that must be taken care of in an installation. A small auxiliary tank must be provided to hold gasoline for starting, while a larger tank should be arranged for the main supply of kerosene fuel. The shifter valve for changing the operation from gasoline to kerosene should be connected conveniently to the dash or control board so that as soon as the engine becomes warm an immediate shift can be made. A primer located in the manifold, just above the carbureter side, aids in cold weather starting.

The Holley heated manifold for Ford cars is intended to vaporize gasoline compoint. In the operation the exhaust gases pass down, striking a hot spot at the top of the internal intake passage. The exhaust gases flow along this intake passage and finally pass out at the bottom. The heavy particles of fuel after leaving the carbureter strike against the wall of the manifold and there are broken up by the heat from the exhaust gases. Should any of the particles not be broken up at this point they will be vaporized when they strike the hot spot as this point is directly in contact with the exhaust gases close to the cylinder.



Cross-section showing construction of Frederickson safety caster axle

SANFORD INCREASES CAPITAL

Syracuse, N. Y., Feb. 18—The Sanford Motor Truck Co. has increased its capital $100,000 and will erect a new factory addition which will provide 50 per cent more floor space. Sales have increased 100 per cent within the last month. Unfilled orders Jan. 1 exceeded $270,000. The new addition will be ready this month, and the company expects to double its production within the next six months to meet the demand.

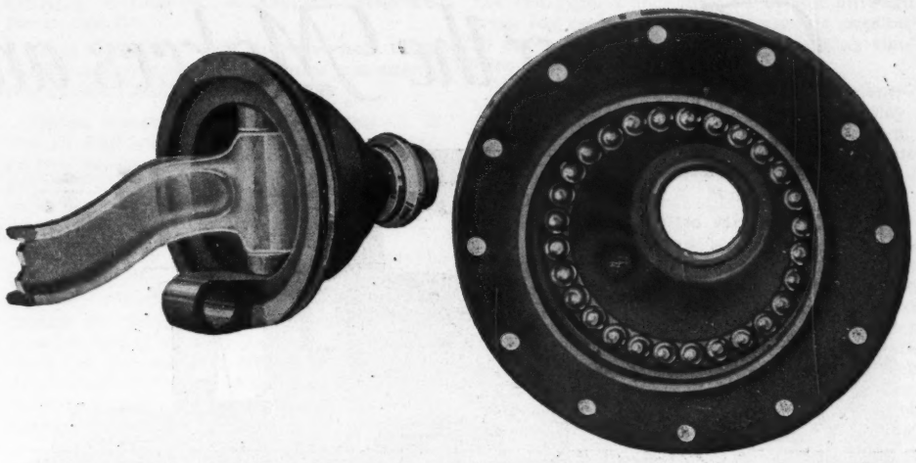
SAFETY CASTER AXLE

The Frederickson Axle Co., Benton Harbor, Mich., has brought out the safety caster axle, in which the pivot pin is located inside the hub, directly over the center of the tread. The car's weight thus is carried inside the hub, removing road shock from the pivot pin. While the pivot pin is set exactly above the center of the tread, it is placed slightly ahead of the vertical center of the wheel. This is said to exert a steady leading action on the wheel from a point a little ahead of its center and the caster-like action eliminates the tendency of the car to leave the road upon encountering obstacles. The

axle also allows a smaller turning radius. One which requires 50 ft. with old style axles will turn in 38 ft. after being equipped with the caster axle. Less power is required in turning, it is said, as the front wheels travel more nearly in parallel circles.

As shown in the illustration the axle is a single forging, extending from center to center of the hubs A, to which the outside plate J is bolted by hub-bolts B. At E is the steel pivot pin supporting axle D. The former works in a bronze bushing G. The pivot pin is held in place by the inner race M of the large bearing. Both sets of bearings are arranged to take side thrust, and the adjustment cap R takes up wear. Once the adjustment is made it can be locked by the screw Q. A steel washer, W, is placed against the large bearing, while a felt washer, C, excludes dust and water. The interior of the hub is filled with lubricant protected by a leather boot, H.

To remove the wheel it is necessary to take off the hub cap S and unscrew R and Q. The wheel then will slip off, and by removing the large bearing the pivot pin can be dropped out, allowing the assembly to come apart.



The end of the solid drop-forged one-piece Frederickson axle extends clear to the center of the hub

WOOD WHEEL MAKERS UNITE

Chicago, Feb. 15—As the result of decisions made during show week the Automotive Wood Wheels Manufacturers' Association will carry out an aggressive form of co-operation looking to the general furtherance of the wood wheel industries. A committee has been appointed to carry out the details. The members are S. Vance Lovenstein, Schwarz Wheel Co., chairman; B. L. Porter, Auto Wheel Co.; A. E. Smith, Hayes Motor Truck Wheel Co.; and C. C. Carlton, Prudden Wheel Co. An unswerving loyalty to the United States Government in productivity; a determination to set their position clearly before the manufacturer, dealer and consumer of trucks and passenger cars and co-operative plans for standardization are three clearly defined planks in the present program of procedure.

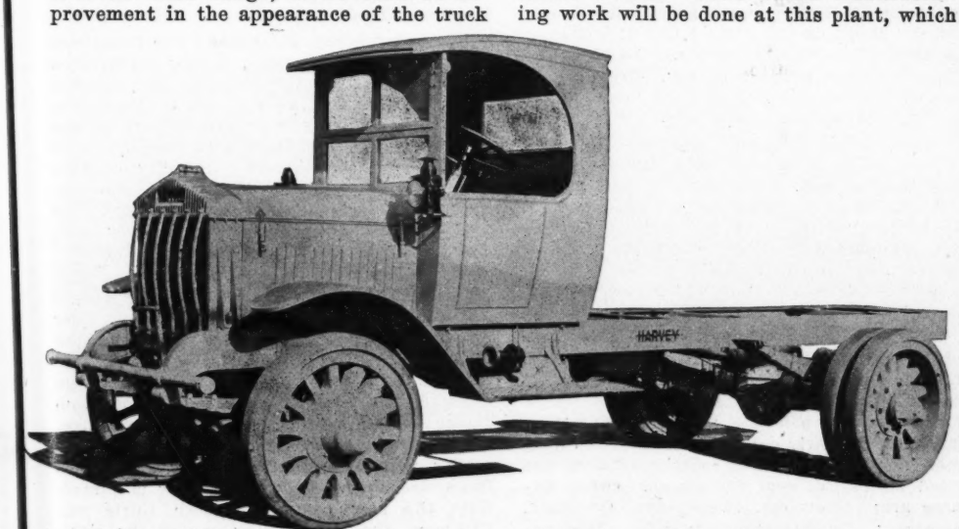
CHANGES IN HARVEY TRUCK

The Harvey Motor Truck Co., Harvey, Ill., has made various changes in the radiator and hood design, which make an improvement in the appearance of the truck as well as in the efficiency of the cooling system. The new radiator now has the cast iron tank and shell and carries the new type of individual fin tube core. With this construction any damage to one or more of the tubes can be repaired by replacing only those tubes actually damaged.

In addition to the bumper on the front of the frame protection for the radiator is provided by steel angle bars which extend from top to bottom across the front of the core. These are bolted to the radiator shell and are sufficiently flexible to bend in case of collision, in which case the bars can be removed and straightened and replaced. The radiator itself is supported on fabric cushions on the frame side members and fitted with coil springs through which extend the attaching bolts.

The hood has been improved and is now a three-piece design so that the sides can be removed in extremely hot weather. A ventilator similar to those in some passenger car hoods is inserted in the top.

The driver's cab has been included in the standard chassis equipment.



Harvey truck equipped with its new radiator and hood design

G. M. PARTS IN WAR PLANT

Saginaw, Mich., Feb. 15—The Peninsula Shell Co. soon will be engaged in the assembly of war materials under contract with the Government in the old Marquette Motor Works. Little actual manufacturing work will be done at this plant, which is intended as an assembling plant, operating in connection with other Michigan plants of the General Motors Co., most of which already are engaged in war work. The parts for assembly will be supplied by the various Michigan General Motors concerns. The Saginaw Malleable Iron Co. will make all the malleable iron castings that will be used. A considerable force of workmen is now employed at the plant, installing equipment and putting it in readiness for production on a large scale. It is expected that the plant will be in operation within the next month, employing approximately 1000 workmen.

NEW MITCHELL APPOINTMENTS

Racine, Wis., Feb. 15—C. W. McDowell has been appointed general superintendent of the four-wheel-drive division of the truck department of the Mitchell Motors Co. Mr. McDowell was formerly general superintendent of the Reo Motor Truck Co., and after it was combined with the Reo Motor Car Co. was general superintendent of the truck division..

George W. Kerr, who was the body designer of the Stevens-Duryea and later in charge of the body designing of the Reo Motor Car Co., has been made manager and superintendent of the body plants of Mitchell.

C. W. Arthur, who was traveling representative of the Reo Motor Car Co., for the last five years, is now special traveling representative for Mitchell and will devote his time to organizing territories.

$1,000,000 FOR NOBLE TRUCKS

Kendalville, Ind., Feb. 15—The Noble Motor Truck Corp. has been organized with a capital of $1,000,000 to take over the business of the Noble Motor Truck Co., a $30,000 concern formed last February. The Noble truck, which was designed and manufactured by the original company, now will be placed on the market.

ACME CAPITALIZES AT $1,000,000

Cadillac, Mich., Feb. 15—The Acme Motor Truck Co., which formerly was known as the Cadillac Auto Truck Co., has increased its capital stock to $1,000,000 and plans an output for 1918 double that of 1917. A program of building and expansion covering five years has been mapped.

Among the Makers and Dealers

SMITH FORM-A-TRUCK ARMY KITCHEN—This kitchen on a Smith Form-A-Truck has been worked out carefully to meet every requirement of Red Cross and Army field service. Heat is obtained from an electric heater receiving current from an electric generator on the truck which is driven by the truck engine, and this heater is assisted by heat derived from the exhaust of the engine. The kitchen is equipped with two 30-gal. fireless cookers, a 30-gal. coffee urn, a 30-gal. vegetable and soup urn, baking and warming ovens and two large hot water sterilizing tanks which will sterilize 120 gal. of water in 2 hr.

MACKIE Now with Saxon—J. H. Mackie has been appointed assistant sales manager of the Saxon Motor Car Corp., Detroit. Mr. Mackie formerly was president of the Mackie Motors Co. of Des Moines, Iowa.

Pioch Becomes Fruehauf Chief Engineer—C. E. Pioch has been appointed chief engineer of the Fruehauf Trailer Co., Detroit, where he will develop special bodies for trailers. Pioch was formerly with the Packard Motor Car Co.

Kip Returns to Old Position—Frank C. Kip, formerly sales promotion manager of the Packard Motor Car Co., has returned to his previous position as sales manager of the Motor List Co., Des Moines, Iowa. He will make his headquarters in Detroit.

Harris Now with Republic Truck—H. F. Harris has been made industrial engineer of the Republic Motor Truck Co. at Alma, Mich. Mr. Harris was formerly assistant branch manager and comptroller of the New York branch of the Willys-Overland Co.

Biddle and Ughetti to Silvex—M. W. Biddle and C. L. Ughetti have become associated with the sales department of the Silvex Co., South Bethlehem, Pa. Mr. Biddle was formerly supervisor of sales with the Champion Spark Plug Co., and Mr. Ughetti was in charge of the Indiana and Michigan territories for the same concern.

Oldfield Tire Co. Organizes—The Oldfield Tire Co., Los Angeles, Cal., has been organized by Barney Oldfield. With him are associated Frank Chance and C. R. Colby. The company will handle Firestone tires and has bought out the Forsythe Tire Service Co. Oldfield is a stockholder in the Firestone Tire & Rubber Co.

R. C. Durant Distributes Scripps-Booth—R. C. Durant, son of W. C. Durant, has taken over the distribution of the Scripps-Booth car for the Pacific coast territory and will be president and general manager of the Scripps-Booth Co. of California. R. C. Durant was recently Pacific coast sales manager for the Chevrolet Motor Co. and head of the Chevrolet Motor Co. of California. He has severed his connection with the Chevrolet factory in that state to take over the distribution of Scripps-Booth.

Dugan Directs Stanley Production—J. F. Dugan has become production manager of the Stanley Motor Carriage Co., Newton, Mass. Mr. Dugan was formerly works superintendent of the Buick Motor Co. and production manager of the Chevrolet Motor Co.

Russell in War Work at Capital—A. W. Russell, president of the Russell Motor Axle Co., Detroit, is devoting his time to the service of the war department at Washington, as an assistant of the assistant secretary of war.

Saxon Plant Nears Completion—The new plant of the Saxon Motor Car Co. is being rushed to completion, the body department having already moved in, and it is expected that the company will be in production in the new plant within the next sixty days.

To Build St. Louis Downtown Garage—The first specially-built downtown garage in St. Louis, Mo., is provided for by the purchase of a lot at Eighth street and Lacus avenue in the shopping district by the Tale Garage & Motor Co. The building will be 70 by 105, two-story and will cost $50,000. Previous and present downtown garages are in old buildings, discarded for other uses.

Have Osgood Service Station—The Auto Devices Co., St. Louis, Mo., distributor for the Osgood lens, has opened a lens service station, where lens will be tested and made to conform with the state law. Many lens are condemned by the city test because the lamps are out of focus, brackets bent or otherwise defective, but which can be corrected at the service station.

St. Louis Gives 447 to Service—A canvass of the St. Louis, Mo., motor trade reveals that the industry there has sent 447 men into the military and naval service. The Dorris Motor Car Co. sent 158 men, many of them going on the early call for motor truck repair men and drivers. The local branch of the Ford Motor Co. sent fifty-three. Other figures are: Chevrolet, twenty-five; Overland, eighteen; Tate-Gilham, twenty; Hudson-Phillips and Cadillac, fifteen each; Packard-Missouri, thirteen, and Park Automobile Co., nine.

Walsh Now with Randall Company—Robert Walsh, former advertising manager of the Maxwell Motor Co., Inc., has joined the Fred M. Randall Co., advertising agent.

Marshall Becomes Jones Officer—Deering J. Marshall has been elected vice-president of the Jones Motor Car Co., Wichita, Kan. Mr. Marshall created quite an interest three years ago when he traded an $80 second-hand Ford for an oil and gas lease, which he afterward sold for almost $300,000.

McGookin Discontinues Service on Lines—Earl W. McGookin manufacturers' representative, Detroit, has discontinued all service and installation on the various lines he represents, but will continue to represent all lines with the exception of the Hayes wire wheel.

Bloomington to Stage Individual Show—The Bloomington, Ill., Automobile Trade Association, has voted to stage an individual show at each garage March 7-9. The annual joint show, which customarily has been given in February, was called off in deference to fuel conservation, and the individual show will serve as a substitute.

Cochran on Coast for U. S. Truck—W. B. Cochran has been appointed western sales manager of the United States Motor Truck Co., Cincinnati, Ohio, with headquarters at San Francisco, Cal. Mr. Cochran was formerly Pacific coast branch manager of the General Motors Truck Co. and before entering the truck field was sales representative for the coast for the Haynes Automobile Co.

Oneida Truck Increases Its Capital—The Oneida Motor Truck Co., Green Bay, Wis., has increased its capital stock from $300,000 to $500,000. A production of 1200 trucks during 1918 has been provided for, and contracts already booked call for nearly 400. The company was organized ten months ago and has placed four models in production and is ready to market a fifth type, of 5-ton capacity.

Webb Now Handling Fulton—A. C. Webb, former manager of the Atlanta, Ga., branch of the Studebaker Corp., is handling the same territory, including seven states, for the Fulton Motor Truck Co. Webb was a pioneer in the building of motor-driven apparatus and at one time was at the head of the Webb Motor Fire Engine Co., St. Louis, Mo., which has been disposed of to James Boyd & Brother, Philadelphia, Pa.

Pronovost Wheel Buys Site—The Pronovost Wheel Co., Toledo, Ohio, a new corporation with a capital of $350,000, has purchased a 60-acre site for a factory. Until this is finished the company will manufacture at the plant of the Central Machine & Tool Co. Dies have been completed, and quantity production will begin soon. The wheel was invented by Joseph Pronovost, president of the company, and is designed to do away with pneumatics by the use of torsion springs.

Big Ford Agency Changes Hands—The Hollander Sales Co., one of the large Ford agents in the New York territory, is to be taken over by a new company under a slightly changed name and representing entry of new interests. John Lurie, who eighteen years ago founded the Auto Supply Co., jobber and dealer in accessories, and who is treasurer and owner of the company at present, together with Benjamin Eichberg and E. R. Hollander, for whom the company is named, form the new company. Both Lurie and Eichberg, the latter being one of the city's biggest diamond merchants, are well known

to the trade. Both have been previously connected with Fiat at Poughkeepsie. Hollander will be president of the new company and Lurie treasurer.

Bacon Becomes Liberty Representative—Richard Bacon has been appointed special representative of the Liberty Motor Co. Mr. Bacon was formerly president of the Chalmers Motor Co. of Minnesota.

Rushes Factory for Airplane Parts—The Haskelite Co.'s new building at Fuller Station, Mich., is being rapidly rushed to completion and it is expected that it will be ready for occupancy in March or April. The Haskelite company manufactures special veneer airplane parts. The company also has a factory at Ludington, Mich.

Western Carbureter Elects Officers—The Western Carbureter Co., Alma, Mich., has elected the following officers: President, Albert Frevert; vice-president, George J. Sandel; secretary, Harley Williams; treasurer, Charles O. Ward. The present output is thirty carbureters a day, but when the plant's equipment is manned properly with efficient workmen and mechanics it has a capacity of 200 carbureters a day. Thirty-five men are employed now.

Bailey-Drake is National Wheel Agent—The National Wire Wheel Works, Inc., Geneva, N. Y., has made arrangements with the Bailey-Drake Co. to act as its agent throughout the West, with offices in Los Angeles, Cal.; San Francisco, Cal.; Seattle, Wash.; Kansas City, Mo., and Minneapolis, Minn. The sales will be conducted as before, through dealers and jobbers, Bailey-Drake acting as agent west of the Mississippi. The arrangement goes into effect March 1.

Jorgensen Books Large Primer Orders—The Jorgenson Mfg. Co., Waupaca, Wis. manufacturer of carbureters and primers, has booked orders for more than 150,000 Jorgenson primers. The contracts were placed with C. H. Jorgenson, secretary, who made a week's trip through the territory. Among the concerns which have adopted the Jorgenson primer as stock equipment for 1918 are Mitchell Motors Co., Sterling Motor Co., Nash Motors Co., Harley-Davidson Motor Co., Milwaukee Works of International Harvester Corp., J. I. Case T. M. Co. and Stegeman Motor Car Co.

Lacey Joins Premier Electric—Bob Lacey has been appointed general sales manager of the Premier Electric Co., Chicago.

Vinton Heads National Advertising—A. E. Vinton has been made advertising manager of the National Motor Car & Vehicle Corp., Indianapolis, Ind. Mr. Vinton has been in the sales department, where he was in charge of export trade.

Westinghouse Moves Departments—The motor car equipment department of the Westinghouse Electric & Manufacturing Co. has moved its manufacturing operations to the Newark works in New Jersey. At the same time the general sale offices of the department were moved to New York, where the eastern district sales office also will be located.

Turner to Expand Tractor Manufacture—The Turner Mfg. Co., Port Washington, Wis., which recently increased its capital stock from $150,000 to $250,000, will devote much of the new issue to the expansion of its tractor department. A production of from 400 to 500 tractors is planned for 1918, without a reduction in its usual output of gasoline engineer. A large part of the output of both tractors and engines already has been contracted for by dealers in the United States and Canada.

Heil Designs Dump Bodies—The Heil Co., Milwaukee, Wis., has obtained a second Government contract for a special design of dump body for use on truck chassis employed in the construction and repair of roads, buildings, bridges, etc., at the front. The company is completing an order for dump bodies for the Government. It recently erected a $100,000 shop addition to be used exclusively for such work. The special body called for in the second order was designed in record-breaking time by Julius P. Heil, president and chief engineer of the company. Upon his return from Washington on Monday, Feb. 4, Mr. Heil started his drawings, and by Wednesday night the first specimens had been constructed and were photographed for the Government. A feature of the body is the tail-gate, which may be swung outward from top or bottom. This makes it possible to carry any kind of a load, from long timbers to the finest sand.

Martin to Manage Templar Employment—Earl R. Martin has been appointed employment manager of the Templar Motors Corp., Cleveland, Ohio. Mr. Martin has held this office with Curtiss, Rubay, Aluminum Castings and Chalmers.

Standard Parts Hold Midwinter Meeting—Increased output and standardization were the principal subjects of discussion at the midwinter meeting of plant and production managers for the Standard Parts Co. at Cleveland, Ohio, recently. Arrangements were made to divert to other plants work under way at the Cincinnati plant which was damaged by fire a few days earlier. Workers from the Cincinnati plant will be transferred to other plants for the time being.

French Contract for Airplane Parts—A contract calling for veneers for airplane parts valued at from $50,000 to $60,000 has been awarded to the Roddis Lumber & Veneer Co., Marshfield, Wis. by the French government. Two representatives inspected the veneer plant last week and then signed orders for the material, which is to be delivered as rapidly as manufactured. The Roddis company also is filling contracts for various kinds of wood material for the Government.

Ohio Jobbers Form Association—The Ohio Automobile Accessories Jobbers' Association has been organized at Columbus, Ohio, by representatives from eleven jobbing houses in the Buckeye State. The organization was affected during the special meeting of the Ohio Automobile Trade Association and was the direct result of a call sent out by H. M. Dine of Canton and Charles E. Justus of Columbus. The association has for its object the good of the jobbing trade and to bring about better conditions between the manufacturer and the jobber. It will be affiliated with the National Automobile Jobbers' Association, with which practically all of the members are individually affiliated. The officers are: President, H. M. Dine; vice-president, J. C. Hipp; secretary, Victor Moon; treasurer, H. H. Brenner.

TRUCKS THAT HAULED HALF A CORD OF WOOD EACH—When a Boston business man had to have cordwood to burn in place of the coal the Fuel Administration kept him from getting, C. S. Henshaw, Dodge Brothers dealer, came to his rescue with trucks which hauled loads of half a cord each from the wood lot to Boston

From the Four Winds

MOTORS HELP SOLVE ST. LOUIS STRIKE—During the streetcar strike when 60 per cent of St. Louis workers motored to their jobs. Every sort of machine traversed the streets loaded to capacity, which was very elastic. The high-powered machines of the rich became, for those days, free jitneys, the owners picking up women and girls en route. Machines owned by business firms hauled their employes free and such others as there was room for

NINETEEN seventeen Montana Registrations Double—Nearly twice as many vehicles were registered in Montana in 1917 as in 1916. In 1916, 25,549 motor vehicles were registered and in 1917, 52,696. The total receipts of the registration department in 1917 were $295,207.70 and the expenses $27,750.10, leaving a net income of $267,457.60.

Urge Completion of Dixie Branch—The Cincinnati Automobile Club has taken steps for the completion of the eastern leg of the Dixie highway, and to that end held a meeting with other civic organizations. It is planned to have the road through Laurel and Rockdale counties, Ky., completed as soon as possible to give a through truck road to the south.

Drug Stores Run Truck Service—The Liggett-Riker-Heggeman drug stores, Washington, D. C., have inaugurated a truck schedule between New York and Washington to overcome the uncertainties of rail shipments. A 6½-ton Packard is used, and it is expected that with clear weather conditions the 300-mile journey can be made in two days and a half.

Wescott Stages Carburetion Test—A Wescott six car recently performed a carburetion feat through an extreme range of temperature. Carrying 705 lbs. it started from San Bernardino, Cal., 220 ft. below sea level, and traveled in high gear up Mount Baldy, a height of 11,038 ft. above sea level. The start was made in the California desert and the finish in the land of perpetual snow. The temperature varied from 97 deg. at the bottom to 24 deg. at the top.

Perseverance Buys a Motor Car—How savings may accumulate for the purchase of a car has been demonstrated by Mrs. J. W. Brooks, Thompsontown Ala., who by saving small change for a year has been able to buy a Maxwell with the results of her saving. Mrs. Brooks saved pennies, nickels, quarters and half dollars handed to her in change, and at the end of the year she had five small cornmeal sacks full. She saved herself a lot of trouble by keeping track of the money she dropped in the sacks, so when the appointed sum was reached she knew it. It took four men all one day to count the money.

Produce by Truck Between Cities—Racklind & Farber, produce merchants of Indianapolis, Ind., and Chicago, have inaugurated a motor freight line between the two cities| The run is 186 miles, and recently a Maxwell truck loaded with 23,000 lbs. of perishable freight went through in 18 hrs.

Protection for the Traffic Man—Semaphore stations for the directing of traffic are rapidly gaining favor. These stations have been installed at Jackson, Mich. The stations are 40 in. square and 7 ft. high, with glass windows on all sides, and are heated by oil stoves. The semaphore signal projects above the roof and is operated by a handle inside the station.

Law Violators Fined Thrift Stamps—Instead of the police curt at Columbus, Ohio, sending violators of the motor vehicle laws to jail or fining them, it has been the policy to release them upon there buying thrift stamps in the sum designated by the court. Recently the police department made about forty arrests for failure to have 1918 license numbers, all of which were released after buying thrift stamps.

Canton Co-operates to Better Traffic—A campaign for better observance of traffic regulations at Canton, Ohio, has been launched by the Canton Automobile Club in co-operation with city officials. Every traffic regulation will be placed before the public and every person in Canton will be asked to regard himself as a private detective to discover violators of the traffic regulations. The club is to set aside a month to be known as Traffic Month, when an effort will be made to have all regulations better understood and observed.

Portland Holds Ninth Annual Show—With thirty-nine different makes of passenger cars, 108 models in all, twenty-three makes of motor trucks and sixteen farm tractors represented, Portland's ninth show opened to a gathering of the trade from all parts of the Pacific Coast. In spite of wartime conditions and difficulties in obtaining shipments of cars, all obstacles were removed by the sixty-seven exhibitors and the show proved to be the largest industrial exposition of the year. Every square inch of available space on the two floors of the auditorium was utilized. Probably the two exhibits which called for the most favorable comment were the tractor exhibits. Sixteen of the latest models were demonstrated, and in addition to sales at the show, many agency contracts were signed up by dealers from various parts of Washington and Oregon. The United States Marine Corps had a complete marine corps motorcycle exhibit.

Coming Motor Events

SHOWS

Feb.	18-23—St. Louis, Mo.
Feb.	11-17—Toledo, Ohio.
Feb.	16-24—San Francisco, Cal.
Feb.	18-23—Syracuse, N. Y.
Feb.	18-23—Grand Rapids, Mich.
Feb.	18-23—Springfield, Ohio.
Feb.	18-23—Des Moines, Iowa.
Feb.	18-23—Duluth, Minn.
Feb.	18-23—Nashville, Tenn.
Feb.	18-25—Pittsfield, Mass.
Feb.	18-27—South Bethlehem, Pa.
Feb.	20-24—Quincy, Ill.
Feb.	20-23—Des Moines, Iowa.
Feb. 23-	March 2—Duluth, Minn.
Feb. 25-	March 2—Salt Lake City, Utah.
Feb. 25-	March 2—Muskegon, Mich.
Feb. 25-	March 2—Indianapolis, Ind.
Feb. 26-	March 2—Omaha, Neb.
Feb. 27-	March 2—Columbus, Ohio.
Feb.	27-28—Burlington, Iowa.
March	2-9—Boston, Mass.
March	6-9—Clinton, Iowa.
March	6-9—St. Joseph, Mo.
March	6-9—Sioux Falls, S. D.
March	6-9—Mason City, Iowa.
March	16-29—Great Falls, Mont.
March	20-23—Trenton, N. J.
March	20-23—Holdredge, Neb.
April	9-13—Stockton, Cal.